SCIENTIFIC AMERICAN

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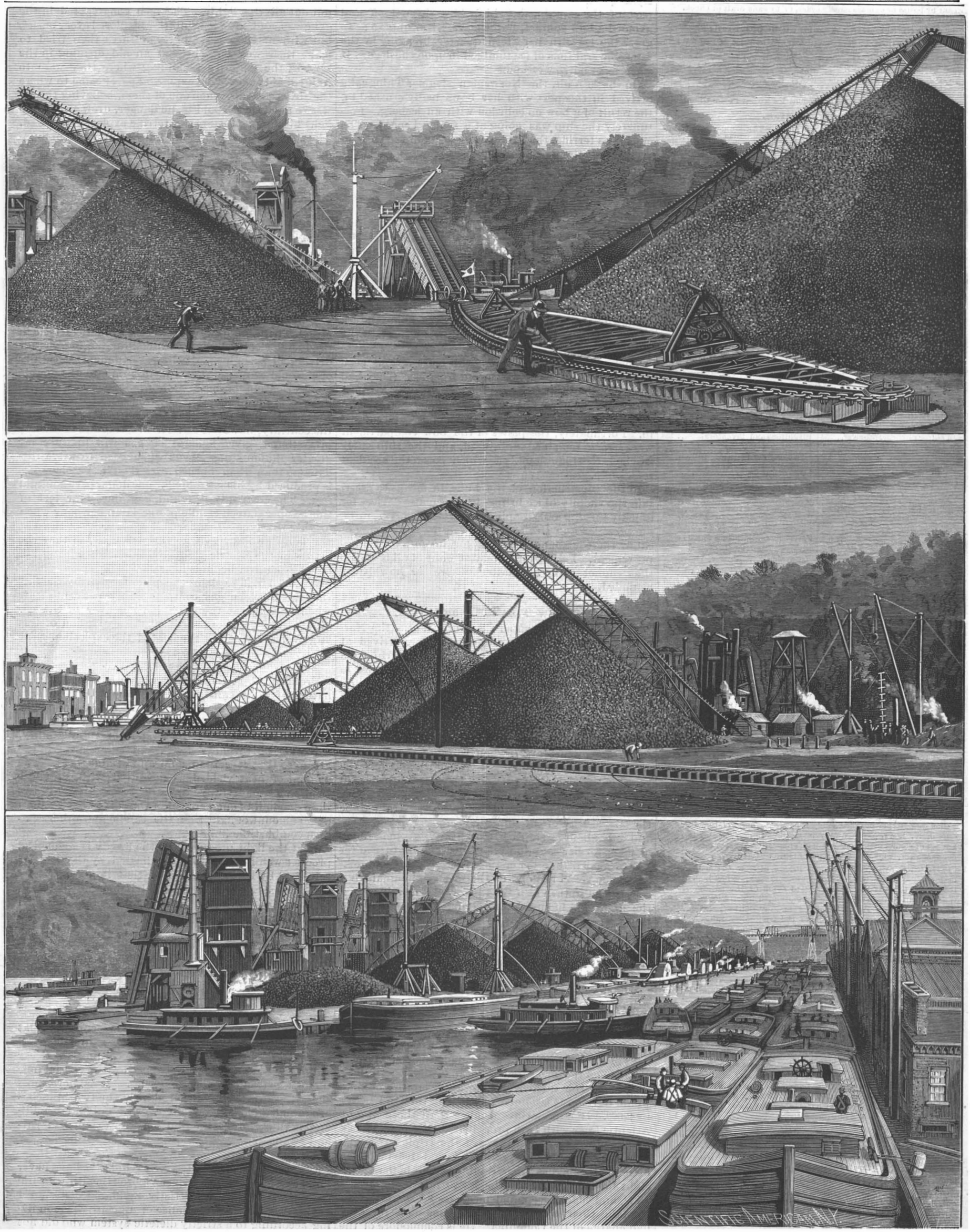

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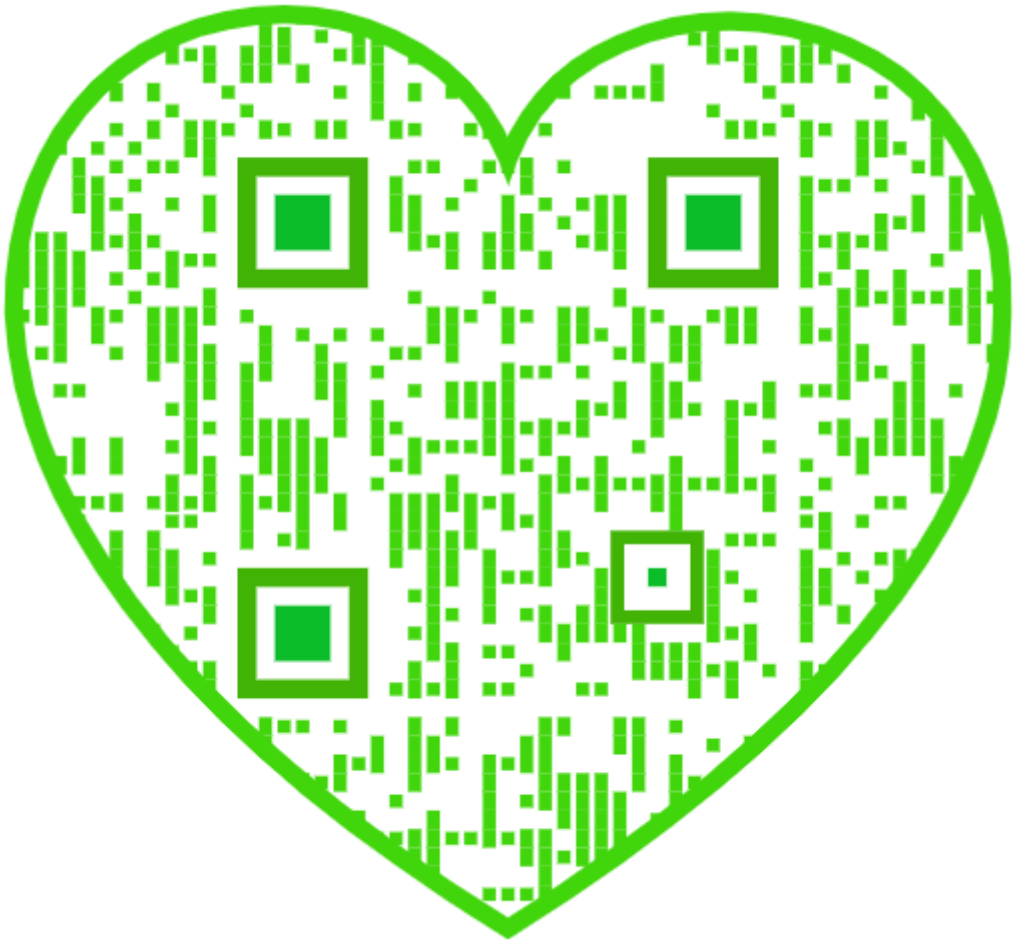

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IMPROVED SHIPS AND LIFE SAVING DEVICES WANTED.

The recent experiences of several steamers plying between New York and Liverpool give renewed emphasis to the call for the invention of new and improved constructions and appliances for saving life and preventing accidents at sea.

On the 30th ult. the new and splendid steamer Normannia, 10,000 tons burden, 16,000 h. p., arrived at this port with part of her quarter rail carried away, having been in contact with an iceberg. Many bergs had been passed. Of a sudden, while going at full speed during a fog, a huge berg loomed up close aboard. By a quick and fortunate turn of the helm on the part of the captain, the ship's bow sheered off and avoided a bow contact, but the vessel swung so as to graze the ice with her stern quarter, breaking in the rail. Several tons of ice tumbled in upon the deck. It was a most narrow escape.

On the 26th ult. the Norwegian steamer Thingvalla arrived in this port with her bows badly crushed in, the result of a bow-on collision with an iceberg. Fortunately the ship was going at a reduced speed. The crash was terrific, the ice tumbled in upon the deck in great quantities, and the stem was torn open from the top to water line. The steamer backed off and stopped. By means of boards and cement the rent in the bow was stopped and the ship continued her voyage to New York. Here was another very narrow escape. On the 20th ult. the new ocean steamer Beacon Light reached this port with a leaky and battered bottom, due to collision with an iceberg. In this case, by a quick turning of the rudder, the ship sheered so as to receive, near the bow, a glancing blow from the berg, careening the ship, and bringing down many tons of ice, some of which fell upon the deck, causing the vessel nearly to capsize; while a great block of dislodged ice that fell into the sea came up under the ship and almost broke through the bottom.

These, we believe, are among the most serious accidents that have recently occurred from ice. They had their parallel in 1880, when the fast steamer Arizona, 5,000 tons, going at full speed, dashed bow-on into an iceberg. Her bow was torn open and the water poured in. Fortunately, the plates of the bow compartment were strong, remained uninjured, and the ship safely reached Newfoundland, off which coast the accident took place.

In the construction of the hulls, in means to ascertain the vicinity of ice in fog, in automatic devices for quickly turning and stopping the vessel, in boats, rafts, life preservers, in means for preventing the sinking of ships, there is abundant room for invention and improvement. Perhaps the greatest want of all is a ship that cannot sink, no matter where or how badly wounded.

THE NEW STEAMER NORMANNIA.

The latest of the superb Atlantic racers, the Normannia, of the Hamburg-American Line, arrived at New York, May 30, making, in her maiden trip, from Southampton, England, the distance of 3,059 miles in 6 days, 21 hours, and 53 minutes. This is within twenty-five minutes of equaling the best time yet made for a similar trip, but the most remarkable feature of the voyage was the narrow escape of the vessel from a great iceberg, which she met dead ahead on the afternoon of May 27, when running at the rate of seventeen knots an hour. Between dawn and dusk the vessel passed twenty-two icebergs, some of them said to have been quite two hundred feet high, but about five o'clock, during a slight fog, what was said to be the largest berg of all appeared directly in her path, and only about a ship's length away. It took but a moment for her captain to have her rudder turned for "hard a-port," and her engines reversed, but so quickly did the vessel respond to the electrical signals that she seemed to turn as if on a pivot, and merely grazed the great ice mountain, receiving some twenty or thirty tons of ice on her quarter deck. The escape was so narrow that the passengers could readily touch the great ice wall, and yet those in the dining room hardly felt the jar of the slight collision which took place, and came so near sending the great vessel with the 1,300 souls on board immediately to the bottom of the Atlantic.

The vessel is a twin screw steamer just completed by the Fairfield Engineering and Shipbuilding Company (John Elder & Co.), at Govan, on the Clyde. Three days after leaving her dock she made the trial speed of 21 knots on the measured mile and 20½ knots on a long run. Her makers guaranteed that her engines would develop 14,000 horse power, and they did better by 2,000. Her screws are smaller than those of any Atlantic liner with twin propellers, being only 18 feet in diameter. Her engines are of the triple expansion type, and have cylinders of 40, 67, and 106 inches in diameter. She has nine double-ended boilers, with eight furnaces to each. She is 520 feet long, 60 feet wide, and 40 feet deep, and measures 8,500 tons gross. Captain Charles Hebich, her commander, formerly had charge of the Columbia. He is commodore of the line. There are 316 men in the ship's company, 158 of whom work in the machinery department. Her coal bunkers have a capacity of 2,700 tons. She is divided into 17 water-tight compartments, formed by 16 bulkheads. She has a double bottom, the inner skin being four inches above the lower, except under the engines, where the difference is seven feet. The water space of this double hull is divided into thirty-six compartments, which will be used for water ballast.

A Sad Mining Accident.

At Ashley, Pa., near Wilkesbarre, on the 15th of May, a sad mining accident occurred, by which some thirty miners lost their lives. While the men were at work in their various chambers, a sudden inrush of air put out all the lights. The men congregated in the gangway, and, after consultation, explored every outlet, but without success. A party of three then tried to make their way out through an old opening in the hillside, the majority remaining where they were to wait till aid came. The exploring party came to where the air was better, when one of them, believing the air was so good there could be no danger, drew a match to light his lamp. Instantly a terrific explosion followed. All the men left behind were killed, thirty-one in number. Of the three in the exploring party, two survived and were rescued.

A correspondent sends us a sketch and description of a simple device for safely lighting a safety lamp. It consists in having a screw plug made to enter the side of the lamp. A pair of scratch plates are attached to the plug, and the match is introduced between the plates through a hole for that purpose in the plug. Contact of the match with the roughened plates ignites the match and lights the lamp wick.

Electric Light from Gas Engines.

A highly interesting fact has been brought out by Mr. O. Tirrill, of New York, in some practical tests in producing electric light by using illuminating gas for driving a gas engine and a Perret dynamo. Naturally one would suppose that the loss due to the double transformation of energy in producing the electric light from illuminating gas by this means would place the cost of the electric light far above that of gas. On the contrary, however, Mr. Tirrill has found to his surprise that a given amount of gas will produce far greater illuminating effects when used to drive this dynamo than when burned direct. The gasolene gas is produced by his machine for one dollar per thousand feet. The engine, it is found, consumes four feet of this gas per sixteen candle power lamp per hour when driving the dynamo under full load, making the cost per lamp two-fifths of a cent per hour, so that the luxury of the electric light by this means, instead of being expensive, he finds in reality to be a great economy. Mr. Tirrill explains the phenomenon by the fact that the gasolene gas contains eighty per cent of air when delivered at the explosion chamber of the engine, and he gets the benefit of the expansion of this large volume of air by the heat of the explosion.

Light of the Fire Fly.

Professor S. P. Langley has been investigating the nature of light emitted by the fire fly, *Pyrophorus noctilucus*, using the spectroscope. He finds the light is substantially from the green side of the spectrum. It is of exceedingly narrow range of refrangibility, extending only from F to C, and culminating in the green, so that it contains no appreciable heat. The amount of heat yielded, as measured with Professor Langley's wonderfully delicate "boloscope," is less than one-half of one per cent of that given out with an equal amount of light from the candle and other common combustible illuminants.

That the light produced by the fire fly is a chemical product would seem to be indicated by the fact, established by Professor Langley, that it decreased by the processes which check combustion and increased by the opposite, that nitrogen quenches it and oxygen stimulates it, while the product of the operation, whatever it may prove to be, is apparently carbon dioxide. It may prove, however, so far as can be judged at present, that these effects are simply those of variation of the vital powers, and a resulting variation in intensity of the light.

Eye Magnet.

In machine shops it is a frequent occurrence that particles of metal penetrate in the skin and eyes. Messrs. Frister & Rossman have, according to *Revue Industrielle*, constructed a magnet for the special purpose of extracting such particles. It is horseshoe-shaped, polished, and nickel-plated; the two branches are rounded off and end in a point only a few millimeters thick. Its attraction for iron extends for several millimeters.

DOCTOR FLINT is quoted as saying: "I have never known a dyspeptic to recover vigorous health who undertook to live after a strictly regulated diet, and I have never known an instance of a healthy person living according to a strictly dietetic system who did not become a dyspeptic."

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Dangers of Gas Heaters.

At a recent meeting of the Balloon Society of Great Britain a paper was read by Mr. A F. Chapple.

The author prefaced his paper by saying that the object he had in writing it was to raise, by his own sad experience and that of others, some interest in the matter, which should eventuate, through the co-operation of the press and those who had to do with the framing of laws, in bringing about some enactment to enforce on all makers of gas apparatus—especially such contrivances as gas and geyser baths—the obligation of not selling these appliances without certain safeguards, so as to avoid such dire calamities as that with which it was his misfortune to be made familiar. The number of persons using gas and geyser baths was, of course, comparatively small, though the number of itself was very large. Having explained the construction of these baths, Mr. Chapple related the circumstances under which his son, who was only in his twenty-first year, lost his life. In September last, he (the author) moved into a house where there was no hot water apparatus; and, at the suggestion of the landlord, a geyser was fitted up in the bathroom. Although he had reasons for believing who the maker of this geyser was, there was no name stamped upon it. Those made by the best makers, as well as by the most remote, were alike open to the same danger, in the absence of "special" precautions. With these precautions he admitted that gas baths and geysers were convenient, and perhaps desirable things; but until the necessity for these precautions was brought prominently before the eyes of those who used the machines, so long would fatalities continue to happen.

Resuming his narrative, he said that his son went into the bathroom early on Sunday morning, September 22, for the purpose of taking a bath. His continued absence causing surprise, some one went and knocked at the door, without receiving any response. An alarm was at once raised and the door broken open, when his son was discovered under the water dead. The gas was still burning and the water slowly flowing. The room was small, and without special means of ventilation. Getting into the bath while the gas was burning had been the fatal step in this and those cases which had since come to his knowledge. But who, asked Mr. Chapple, lacking the combined knowledge of chemist and gas engineer, was to know that, if he entered the bath under such conditions, he would never come out alive? He believed it was a fact that the oxide of carbon fumes generated by the atmospheric or Bunsen burners of these appliances were so deadly that a thousandth part in the air would destroy life, and so heavy that, directly they cooled on leaving the apparatus, they fell to the ground, and so enveloped the head of the victim, depriving him of the consciousness that he must immediately get fresh air or die in a few minutes. This deadly gas closed the air cells of the lungs, and killed the blood in the sense that it paralyzed those ever-changing conditions which were kept in constant activity throughout life by the vitalizing property of oxygen contained in pure air.

Having instanced other cases in which death had been caused by gas-heated baths, Mr. Chapple referred to some experiments he made after his son's decease. He lit the geyser, and turned on the water—regulating the gas and water to the same volume, as near as he could judge, to that prevailing on the fatal morning. He then placed a lighted candle on the side of the bath, at about the same level as the head of an adult would be while using it; shut the door of the room; and reopened it in ten minutes. The candle was burning dimly; but, of course, it immediately revived on the admission of fresh air. The experiment was repeated, but the door was not opened for the space of twenty minutes, when the candle had the appearance of having been out several minutes. The candle was found extinguished after a subsequent experiment of seventeen minutes' duration. From these experiments, the author was led to infer that the candle would not burn under those conditions much beyond twelve or fifteen minutes, which, he added, meant the extinguishment of life in about the same time. A repetition of the experiment, with the window open one inch at the top, showed that, at the end of twenty minutes, the candle was still burning brightly. He expected to be told that, if the room was small, the window should be kept wide open while the bath was filling; and the gas and water in any case be turned off before any one entered the bath. This he fully admitted; and it was what he desired to impress on the public.

THE "instructions for engineers," published in the SCIENTIFIC AMERICAN of May 17, although issued by a Western pump manufacturing company, are, in fact, the "rules for the management and care of steam boilers," first published by the Hartford Steam Boiler Inspection and Insurance Co. It is true that such rules cannot too frequently be called to the attention of firemen and engineers, but the Hartford company first issued this set of rules some eighteen years ago, and is entitled to great credit for the energy and persistence it has manifested in keeping them before buyers and users of steam boilers.

A Chat on Orchids.

MRS. N. PIKE.

Of late years great attention has been paid to the growth of orchidaceous plants, and as a natural consequence they have become fashionable with those who have well filled purses. It really needs them, for, whether as ornaments for a conservatory, or as cut flowers, their price is higher than ordinary ones. No wonder that all flower lovers are attracted when our florists mass together the rare and curious productions of this singular order, and display them to the public. Flora must have been in her happiest yet most versatile mood when she combined such an odd mixture of beauty and grotesqueness.

Look at the tortuous stems and roots, the varied leafage, and the brilliance or insignificance of their blossoms. In some are blended the most exquisite colors, the tenderest shades of pinks or yellows, with a sudden dash of the richest crimson or purple velvet. In others the flowers are inconspicuous, yet are they noticeable for their leaves; and again some greet you with perfumes from "Araby the Blest," while there are those insupportable from their fœtid odor.

Not content with her own realm, Dame Flora has invaded the animal kingdom for her models, as is well seen in the imitation of a dove in the "Holy Ghost" flower or in the butterfly orchid. Instead of confining them to earth, she has placed her epiphytal or true orchids as parasites on living trees, whence they fling out their wreaths of fragrance, or they close with a beauteous shroud the gradual decay of her forest giants as they lie prone in the dank depths of tropical woods. Nor has she been sparing of her treasures. With the exception of regions where extreme cold or dryness reigns, orchids are found the world over. They grow in all temperate climes, as, for instance, our own Northern States, but more especially do they love the humid, steaming forests of Mexico, Brazil, Madagascar, etc. Few are of any use economically save the vanilla, but are of that other greatest use,

"To minister delight to man,
To beautify the earth."
"To comfort man, to whisper hope."

It is well known that most orchids can only be grown at all in hothouses where the temperature and soil can alone be made to resemble that of their native homes, and it is generally supposed that all others must have a greenhouse at least. I would suggest to my flower-loving sisters that there are many, not the gorgeous blooms of the tropics, but others of much interest to amateurs, that can be grown in a house that has the ordinary temperature of 60 or 70 degrees. There are *Odontoglossums* and *Oncidiums*, especially the papilio or butterfly orchid, which thrive with much less care than is often bestowed in winter on a rose or fuchsia that gives most unsatisfactory results. Have them well arranged by a florist, and you may bring to your homes denizens of far-off lands; they only want care and patience to reward you.

Then in a garden there are many of our lovely so-called orchids that can be transplanted from their marshy beds if you only follow Nature's own methods of growth. Take up your plant in a good clump of the fibrous earth they revel in, plant in a shady spot, say among ferns and wild flowers, and never let the roots get thoroughly dry. In winter again go to Nature and see how she cares for them. Mulch them with dead leaves, but never let manure be put over them, or they will be a dead failure and rot out. I speak from sad experience, for I lost a number by a gardener smothering them with manure from a stable near by.*

Habenarias, the curious *Cypripediums*, or ladies' slippers, *Spiranthes*, *Pogonias*, and many others will succeed in a "wild garden." Where you have room to devote a spot to one it will well repay you, believe me. "All labor hath profit," and truly nothing like a garden yields so large an interest in health and pleasure. Care for your pets yourself, for they will never thrive unless you love them enough to treat them as Eva did Topsy, instead of leaving them to the precise but harsh rule of "Miss Feely," alias the hired man. Never forget, when you allow your flower beds to be invaded, the advice of the farmer: "Digging is hard work, let Pat do it, but—it will pay to sit on the fence and watch Pat dig;" and especially is this true where your choice flowers are concerned.

While speaking of these interesting plants, it will not be out of place, I hope, to say a few words about an orchid show I attended in New York a short time since. Those who did not or could not go lost a great treat. It was truly a tropical scene, and much of it took me back to the time when I wandered in the forests of the isles of the Indian Ocean in search of ferns and orchids. Wreaths of greenery ornamented the whole room, and pendant were numerous baskets filled with *Nepenthes*, their curious little pitchers hanging low down. Every table had a palm in its center, fan, sago, or the rarer *Chamærops*, with orchids creeping up their rugged stems. One arrangement gave a peculiar charm to the place. The orchids were all embedded in masses of tender green *Adiantums*, and their delicate colors were enhanced by their surroundings. The smaller ones appeared as if they sprung from the graceful ferns instead of their own twisted stems.

To adequately describe those rare blooms would fill columns of space, but some were worthy of special notice from even a casual observer. The grand *Cattleyias*, from purest white to tender pinks and lilacs, with their diaphanous petals and deeply fringed, velvet lips, were in abundance. The orange *Lælias*, the fleshy, creamy *Lycaste Shinneri*, the yellow *Oncidiums* and varied *Cypripediums*, with slippers of hues fitting for an odalisque or Titania, and so many others I have neither time nor space to enumerate, made up a delightful picture.

A great deal is said of the value of museums and all collections of objects of natural history, and it is true in the widest sense. To the general public, especially those who have rare holidays, but have the wish to learn and appreciation of all they see, they are both recreation and profit. Forms are brought before them they are never likely to see in the flesh; but the life-like work of the taxidermist places them actually before their delighted eyes. To the student, who goes deeper into the nature of all created things, not enough can be said in praise of such institutions, and it is a shame that any large city should be without them. Yet they are only dead, inanimate forms, however great may be the semblance of life given them.

Here let me say a word in favor of the flower shows I am glad to see increasing in frequency. Take this orchid show I speak of, for instance. There massed together are plants, living, sentient beings, collected at vast expense of toil and money. They are placed before us in all their tropical beauty, growing as luxuriantly as in their homes in the depths of Brazilian or Sumatran forests.

The true botanist, who has spent midnight oil in poring over scientific works on botany, revels in the sight of these plants of such varied and curious organization, and his eyes at last realize what his brain had conceived before; and I fear many a one longs to use his dissecting scissors to unravel some unlooked-for complications in their singular construction. To the real lover of flowers for their own sake, independently of science, it is a rare treat; and one can quietly contemplate such a wealth of floral loveliness inhaling their fragrance, and taking in every feature of the display with intense delight.

Equally in a show of roses and other common flowers, it gives food for thought and pleasure to see art and nature hand in hand. By all means give us as many flower shows as possible, but let the price of admission be within the reach of the slender purse as well as the full one.

*I should state that the clump of fibrous earth brought from the woods to the garden degenerates after the second year's blooming, so care must be taken to renew it. Carefully break up the old mass, giving especial attention not to touch the roots, then add a quantity of fresh fibrous matter from the woods and pack it well round them. By this method our common orchids may be kept in a garden for years.

James Nasmyth.

On May 7 there passed away, at the advanced age of eighty-one, the famous engineer James Nasmyth, the inventor of the steam hammer. He was born in Edinburgh, and quite early in life showed a taste for mechanics. When he had reached a sufficient age to attend classes at the Edinburgh University, he was able to pay his own fees from the sale of models of steam engines and other mechanical contrivances which he had constructed under his father's roof. In the year 1829, when he had just completed his twenty-first year, he went to London and offered his services to Mr. Maudslay, the founder of the well known firm of engineers. He remained with them till 1831, when he started in business on his own account in Manchester. The work which came to him increased to such a degree that he had to erect more extensive premises, which developed into the celebrated Bridgewater Foundry. Here he devised and perfected a large number of mechanical tools, the most famous of them being the steam hammer, which was invented in 1839. Among the other appliances perfected by Nasmyth may be mentioned his safety founding ladle, the double-faced wedge sluice-valve, a reversible rolling mill, a form of steam engine derived from that of his steam hammer (and now almost universally adopted for screw steamships), and a spherical-seated safety-valve. In 1857, at the age of forty-eight, Mr. Nasmyth retired from the business, and went to reside at Penshurst, near Tunbridge, where his principal pursuit was astronomy.

Signing a Check by Electricity.

One of the marvels of electricity, and one of the most striking of the Edison exhibits at the Paris exposition, was the little instrument which enables the operator to sign a check 100 miles distant. The writing to be transmitted is impressed on soft paper with an ordinary stylus. This is mounted on a cylinder, which, as it revolves, "makes and breaks" the electric current by means of the varying indentations on the paper. At the receiving end of the wire a similar cylinder, moving in accurate synchronism with the other, receives the current on a chemically prepared paper, on which it transcribes the signatures in black letters on a white ground.

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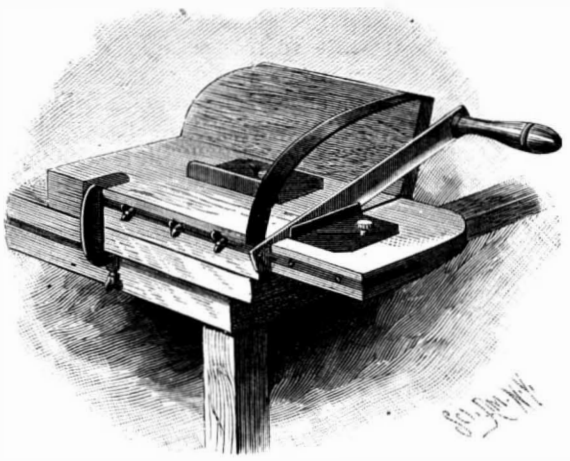
STONE'S BREAD CUTTER OR SLICING MACHINE.

The accompanying illustration represents a device of simple construction designed to be an effective bread cutter, with a rotary stroke, and also a cutter and slicer for meats, vegetables, etc. It is the invention of Mr. D. G. Stone, of Negaunee, Mich. The body of the

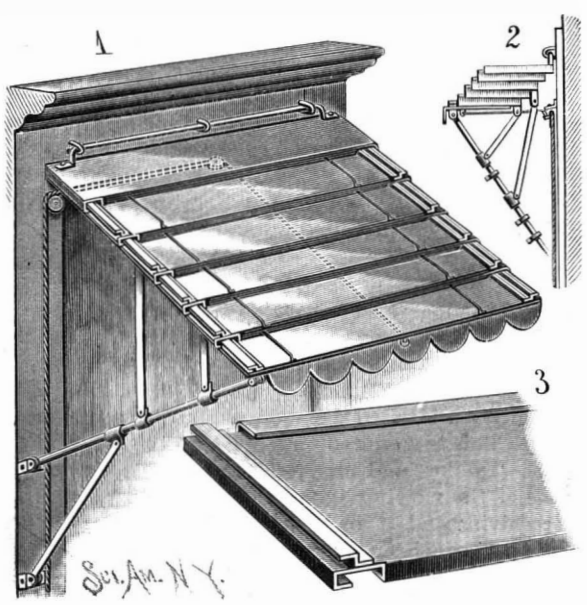


STONE'S BREAD CUTTER OR SLICING MACHINE.

device consists of a horizontal table, with a back connected from its top to one end of the base by a curved guide bar, against which the cutting blade is operated, and arranged in connection with this base, in the same plane, is an auxiliary table, adjustably attached to the main table by a rod or bar and thumb screws. The auxiliary table is held a sufficient distance away from the main table to permit the free movement of the knife between the two sections, the knife being journaled on the rod or bar connecting the two parts, to be capable of rotary motion. On the extended portion of the table supported by the connecting rod is a gauge for regulating the thickness of the slices to be cut, and there is also a gauge on the main table for use when small articles are to be sliced, to bring the work near the axis of the blade. The whole device is attached to the kitchen table or other support by means of a clamp. This device lends itself readily to a rocking stroke or motion of the knife, rendering unnecessary the complete revolution of the blade unless such motion is deemed most desirable in the work being done. For further information relative to this invention address the inventor as above.

AN IMPROVED METAL AWNING.

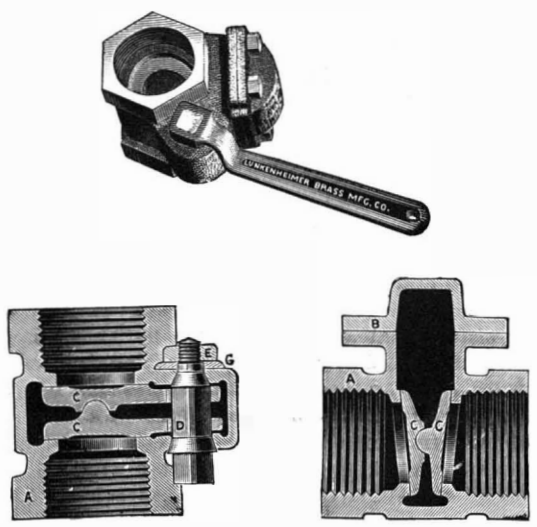
The awning represented in the illustration is designed to be constructed at a moderate cost, and to provide for the firm support of the several awning sections. It has been patented by Messrs. T. W. & B. T. Wood, of Berlin, Wis. Fig. 2 is a side view of the awning when folded, Fig. 3 showing the end of one of the sections, and Fig. 1 representing the awning in extended position. The upper awning section is provided with a rod or bar, to be secured to the window or door frame by staples, and all the sections have end flanges, so that they will readily interlock with each other. To steady and partly guide the sections, each of the lower sections has rods which pass through apertures in the downwardly extending sections of the flanges of the section above. To each side of the window or door frame is hinged a rod pivotally connected to the lower awning section, and on this rod is a sleeve, to which is pivotally connected a brace, hinged lower down on the frame. The main body of the awning is supported by intermediate braces pivotally connected to sleeves on the main side rods, in connection with suitable stops. The awning is raised and lowered by a rope or cord attached centrally to the lower side of the lower section, and leading thence to sheaves at the top and side, where it is extended downward to within reach of the operator.



WOODS' METAL AWNING.

A NEW STRAIGHTWAY VALVE.

The accompanying illustrations show a new form of straightway valve for steam, water, gas, oils, etc., now being placed upon the market by the Lunkenheimer Brass Manufacturing Company, of Cincinnati, Ohio. In size it is smaller than the ordinary globe valve, the first figure showing the full size of a ¾ in. valve. The two disks, C C, are independently and loosely secured to the operating stem, D, and are adapted to close against tapering seats in the valve shell, and being provided with ball and socket bearings at their backs, are evenly wedged against their corresponding seats when the valve is closed by the lever. The stem, D, is operated by a lever and turns in tapering ground joint bearings, being held in place by a nut, E, which is guarded against displacement by a "D" or square washer, G, on the same principle as used in the ordinary steam stop cock. Any desired friction can be brought to bear on this stem by means of the nut, thus securing a steam-tight joint and dispensing with the usual stuffing box. This frictional bearing also prevents displacement of the valve disks and lever, so that the valve will remain at any desired opening. The lever fits a square on end of stem and is detachable. The valve is easily taken apart when necessary by unscrewing nut, E, and upon removal of washer, G, stem, D, and cap, B, the disks can be withdrawn from the valve shell. These valves are at present being made in sizes in brass from ½ in. to 3 in., and in iron from 2 in. to 6 in. inclusive, screwed ends. The best steam metals are used in their manufacture, and they are designed to be used in place of gate valves, stop cocks, or globe valves, and especially for fluids in oil works, refineries, etc. Sizes larger than 4 in. are not so well suited for steam above eighty pounds pressure.



A NEW STRAIGHTWAY VALVE.

When placed near the ceiling they can be operated by a rod or rope. This new valve has been named the "Handy" valve.

New Inventions.

Inventors of this or that device which is intended to overthrow all existing plans and systems often feel that the public do not appreciate their efforts, and leave their invention untried out of sheer pique, indifference to new things, or conservative ideas which can see no good in anything new. So far as this relates to public travel or to large interests, it is a mistaken one on the part of inventors. Capital is always anxious to save even a small percentage of loss, and if a new machine or process actually accomplishes what it claims to, it is quickly adopted, but too often the claims made do not exist in fact, but only in the imagination of the inventor, and where this is the case the public find it out quickly. Not many years ago it was discovered that the system for using steam in marine engines was radically wrong, and that greater economy could be had by certain other systems. When the fact was established, no other kind of engines than the new were built, and ships which were worth it had their old engines torn out and thrown away, to be replaced by the new system. There was no hesitation whatever; it was simply the logic of facts. Sometimes the inventor is a pioneer, and makes discoveries which the world is not ready for, but if he is right in his principles, and has not discovered a new philosophy of mechanics to fit his machine, he will certainly attain the end he eeks. —*The Engineer.*

AN IMPROVED FODDER FORK.

The illustration represents a simple and convenient implement whereby corn fodder or grain in sheaves, etc., may be gripped and lifted upon a wagon, and readily released at the will of the operator. It has been patented by Mr. Charles L. Rudiger, of Ridgeway, Kansas. The implement has a single tine or fork bow, in connection with a metallic keeper bar having a ring eye and oppositely extending limbs. On one limb are ears pivotally secured to the ear of a ring traveler that slides on the handle, and both limbs are slightly elastic, the limbs being so bent from their hinge point that one of them extends toward the free end of the fork bow, and can be adjusted to clamp a sheaf or bundle of fodder within the bow of the fork.

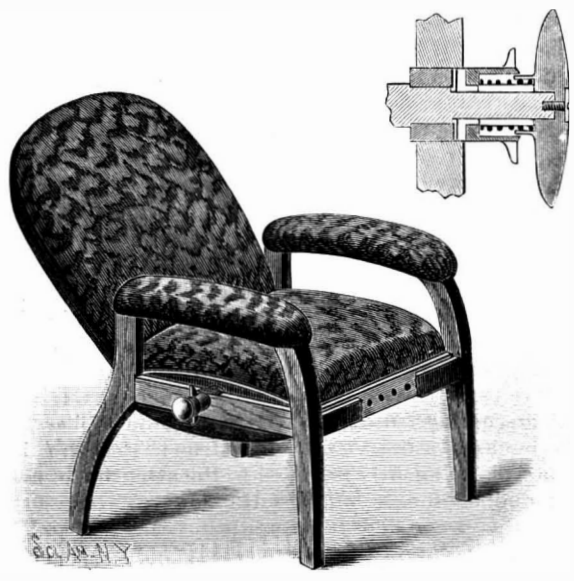
RUDIGER'S FODDER FORK.

Upon the handle is a sliding sleeve having two parallel lugs, between which the lower end of the other keeper-bar limb may be located when the sleeve is slid upwardly and suitably adjusted. Preferably there is a longitudinal slot in the sleeve, through which a guide pin is inserted in the handle to limit the travel of the sleeve and retain the lugs in proper alignment with the end of the keeper bar. The sleeve also has a handle to facilitate moving it to the proper position. The keeper bar by its elastic pressure holds the ring traveler frictionally engaged with the handle, and this, with the contact of the lower end of the keeper bar between the lugs, prevents slipping of the bar until it is designedly released.

AN IMPROVED REVERSIBLE SEAT FOR CHAIRS.

The illustration represents an improvement especially designed for application in the construction of barbers' chairs, the small figure being a sectional view through one portion of the chair frame and the actuating axle of the seat frame. The side pieces of the seat frame are bored to receive a rectangular hollow offset integral with one face of a plate through which is passed an axle, the extremities of which are cylindrical, and each provided with a longitudinal groove. The knob on the outer end of the axle has on its inner face a hub of greater diameter than the axle, and the cylindrical sections of the axle at their junction with the rectangular portion are journaled in bearings in each side piece of the chair frame. Over each cylindrical section of the axle slides a sleeve having on its inner end an interior flange and feathers, and with wings on its outer surface, as shown in the small figure, the inner ends of the feathers entering the longitudinal axle grooves and their outer ends entering slots in the bearings. Around the axle, within the sleeve and the hub of the knob, is a coiled spring, bearing at one end against the knob and at the other end against the flange of the sleeve. The seat is similarly upholstered on both sides, and is reversed by pushing the sleeve with one hand outward toward the knob, against the tension of the spring, thereby disengaging the feathers of the sleeve from the recesses in the bearings, and turning the knob with the other hand, the axle being then free to revolve a half turn. On releasing the sleeve, the spring forces it inward and causes its feathers to lock into the recesses of the bearings, when the seat has been completely reversed. A series of ventilating tubes is also provided within the seat frame, whereby the upholstering material of the seat will always be open to the access of air from the outside.

This invention has been patented by Mr. Joseph B. Popenhagen, of No. 85 Loomis Street, Chicago, Ill.



POPENHAGEN'S REVERSIBLE SEAT FOR CHAIRS.

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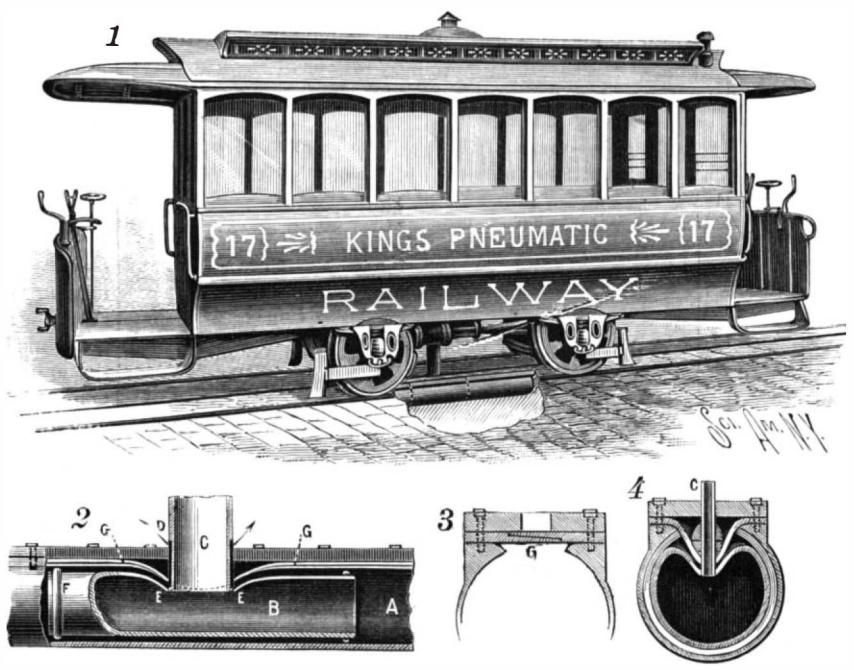
AN IMPROVED PNEUMATIC RAILWAY SYSTEM.

The accompanying illustration represents a pneumatic railway system, patented by Mr. George W. King, designed to provide, by simple and efficient devices, a continuous air current to the motor on the car body, without leakage, and without friction or pressure on the valves, while requiring no radical changes in the permanent way. Fig. 2 is a longitudinal section of a portion of the air tube or conduit, Figs. 3 and 4 being cross sections, while Fig. 1 represents the application of the system on a street railway. The underground conduit is indicated at A in Fig. 2, and it has a continuous slot over which fold flap valves riveted to the edges of the slot, as shown at G in Fig. 3. The piston, B, consists of a tube of slightly less diameter than the air tube, and on its outer edges are packing rings, F, making a close joint between the tubes A and B, while the upper face of the piston has a central depression serving as a recess for the ends of the valves when they are depressed. A hollow connecting shank, C, is rigidly secured to the piston in this depression, the upper end of the shank being connected with any suitably constructed motor on the car body. The shank is elliptical in horizontal section, its ends serving as openers or spreaders as they pass along in the slot of the tube, making continual communication between the tube and the motor. To gradually open the flaps as the air-connecting shank passes along, the lower longitudinal faces of the latter are provided with horizontal cams having curved under faces, whereby, as the shank passes along the air tube, communication will be had between the atmospheric air and the air in the pocket or chamber formed between the piston B and the tube A, and so much of the valves as is necessary to be spread apart will be relieved of air pressure, thus reducing the frictional wear on the valves to a minimum. To effect such communication with the outer air, the shank, C, is provided with short vertical air channels, D, the upper ends of which open out above the conduit, while their lower ends open into the space, E, below the flap valves when in their lowermost opened position, whereby any compressed air in the pocket between the cylinders will escape. It is claimed that the cost of construction and maintenance under this system will be low, the cars carrying no unnecessary weight, and there being small loss of power by friction, while it is unaccompanied by noise, and the cars can be started and stopped without jerking. The necessary bells, gongs, brakes, etc., may all be worked automatically by the compressed air, which may also, after use in the motor, be utilized to assist ventilation when this is deemed desirable.

For further information relative to this invention address the patentee, No. 1251 High Street, West, Washington, D. C.



KING'S PNEUMATIC RAILWAY SYSTEM.

The Odor of Musty Volumes.

One of the assistants of the British Museum tells me that visitors to that institution frequently have a hard time getting "acclimated" to the place. An hour spent in the rooms invariably gives the visitor (for the first time) a headache. Sometimes it is only after repeated visits that one is able to indulge his researches without carrying away a headache with him. Women seem particularly sensitive to this curious malady, which is said to arise from the peculiar odor created by the storage of so many books. You can get some idea of what this odor is by going to your bookcase, that has been closed for twenty-four hours, and opening one of the doors; immediately your olfactories will be greeted by the mustiest fragrance imaginable. Bibliomaniacs profess to love this odor, and many declare that they cannot value a book unless it has about it that unmistakable and ineradicable smell which infects a volume when once it has crossed the sea in the hold of a vessel.

William Blades, on the other hand, says that the musty smell betokens the decay of a book, and he cries out against all bookcases which are tightly closed. It is his theory that books require pure, dry air constantly, and the result of his experiments and experience seems to be that the most healthful kind of bookcase is one that has lattice doors, behind which may be hung thin curtains to keep out the dust.—*Chicago News.*

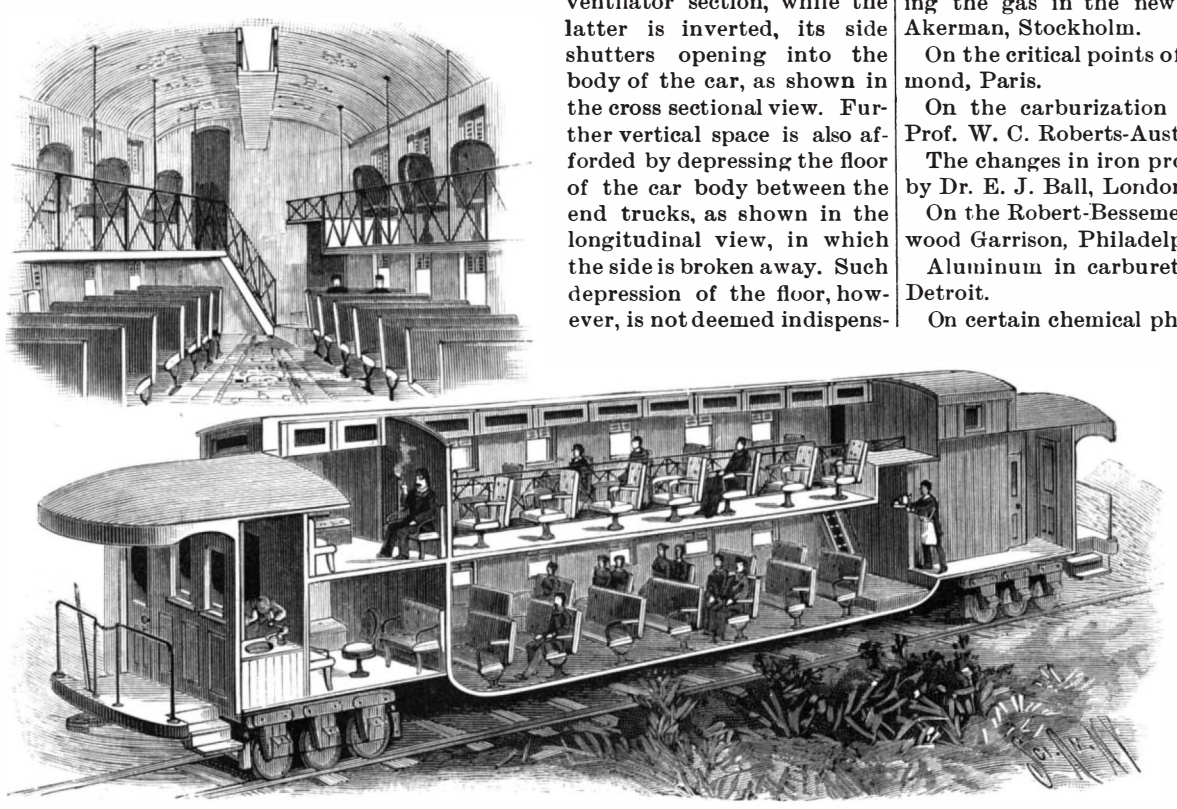
Explosion of a Dynamite Gun.

At a trial of the Justin dynamite gun, near Rome, New York, on May 27, the gun exploded and hundreds narrowly escaped being killed by the flying pieces. The gun was a 9 inch cannon which had been in use during the late war. The shell that burst the gun weighed 273 pounds without the explosive, which consisted of 16½ pounds of dynamite, the shell being 9 inches in diameter and 44 inches long. It had been intended to try the Justin system of projecting dynamite by firing six shells, and large crowds were present to witness the experiment, but the explosion took place in firing the first shell.

AN IMPROVED PASSENGER CAR.

The illustration shows a car not exceeding in height the usual drawing room coaches, or at the most only slightly so, so that the bridges and tunnels of the regular railway lines can present no obstacle to its passage, but the construction is such as to provide two floors or tiers of seats, thereby largely increasing the carrying capacity of the car. This is effected mainly by the manner in which the space at present occupied by the car ventilator is made available, the sides of the car roof being carried up to the full height of the usual ventilator section, while the latter is inverted, its side shutters opening into the body of the car, as shown in the cross sectional view. Further vertical space is also afforded by depressing the floor of the car body between the end trucks, as shown in the longitudinal view, in which the side is broken away. Such depression of the floor, however, is not deemed indispensable, for it will be seen that the central aisle of the car is of full height, permitting ready access to the side seats of the main floor therefrom, while the side galleries above, each accommodating only a single row of chairs, do not extend to the full width of the seats on either side of the aisle below. The car is of the ordinary construction at the ends, except that it has a comfortable smoking and lookout room in the upper part, which adds greatly to the convenience of passengers. The ventilator is arranged to permit the ready flowing off of water during rain without obstruction to the thorough ventilation of the car at all times.

This car forms the subject of a patent which has been granted to Mr. Orlando Harriman, of No. 43 Wall Street, New York City.



HARRIMAN'S PASSENGER CAR.

Unfortunate Bridge Building.

Another accident occurred at the Louisville and Jeffersonville bridge, May 14, at Pier 4. The working chamber of the caisson had been built, launched, and was in position between two rows of heavy guide piles, tied together at heads, and the crib was being built upon the caisson roof, 13 courses being in position and partly concreted. The river had been rising rapidly, and the current was very strong, and the water about 28 feet deep. The guide piles at the lower end gave way first, and the other side followed; the caisson and crib, thus unsupported, toppled over and carried with it the caulkers and carpenters, and four men lost their lives, among them Charles P. Mitchell, the superintendent for Sooysmith & Co. Mr. Mitchell was struck by one of the falling cross braces, and the other men were carried under the caisson and the floats by the swift current and drowned.

The "six" guide piles were 18 inches in diameter, driven 20 feet into the river bed through 28 feet of water, says the *Courier Journal*, of Louisville. The caisson was 25 by 54 feet on the base and was 24 feet high, including the roof. At the time of the accident the top of the caisson proper was 2 feet under water, but the cutting edge was not quite on the river bed. The caisson was suspended at the four corners by steel wire rope to the cross bracing supported by the guide piles. According to the report of Louis P. Anshutz, one of the caulkers, these cables parted and at the same time the supporting timbers gave way. The caisson itself is said to have turned completely bottom-side up.

The Iron and Steel Institute will Visit the United States.

The annual meeting of the Iron and Steel Institute was lately held in the theater of the Institution of Civil Engineers, London, the president, Sir James Kitson, occupying the chair. The following papers were read:

On a new form of Siemens furnace, arranged to recover waste gases as well as waste heat, by Mr. John Head, London, and M. P. Pouff, Nevers.

Calculations concerning the possibility of regenerating the gas in the new Siemens furnace, by Prof. Akerman, Stockholm.

On the critical points of iron and steel, by M. F. Osmond, Paris.

On the carburization of iron by the diamond, by Prof. W. C. Roberts-Austen, London.

The changes in iron produced by thermal treatment, by Dr. E. J. Ball, London.

On the Robert-Bessemer steel process, by Mr. F. Lynwood Garrison, Philadelphia.

Aluminum in carbureted iron, by Mr. W. J. Keep, Detroit.

On certain chemical phenomena in the manufacture of steel, by Mr. W. Galbraith, Chesterfield.

The estimation of phosphorus in the basic Siemens bath, by Mr. W. Galbraith, Chesterfield.

On the Rollet process for producing purified castings, by Mr. A. Rollet, St. Etienne.

"The autumn meeting of the Institute is this year to be held in America. The meeting will be held in New York, and we hear," says *Nature*, "rumors of vast preparations that are being made by the hospitable metallurgists and engineers of the United States to welcome their British *confreres*. Members are left to make their own way to New York, but upon landing they become the guests of the American Institute of Mining Engineers. From an outline programme we have seen, it would appear that the only limit to the excursion will be the time at the disposal of members, which, those who know American hospitality best will agree, is sure to be exhausted long before the good nature of their hosts."

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Pails.

The old process is briefly described: The logs are taken from the river dripping with water, and sawed into sections of the length required. This operation is of course common to some extent in the saw mills, and is probably familiar to the reader. These blocks are then taken to the machine used for cutting the staves, which contains a circular saw, thus causing the staves to possess the curves which can be observed in any common pail or tub. But it is in the dry houses that the marked improvements have been made. The old system which we are describing consists simply of wheeling the staves in their green condition to the brick dry house, where they were dried by a huge furnace from which pipes ran here and there beneath the rooms in which the staves were piled. These apartments had an open floor, that is, the different pieces of floooring were laid one or two inches apart to admit the heat from below. With this system from eight to ten days were consumed in getting the staves properly seasoned for use.

THE NEW PROCESS.

All this is changed and improved. The new process which was inaugurated merely on trial works to a charm, and it is the intention of the company to adopt and enlarge it. To begin with, an elevated platform is built about fifty feet in the air, of considerable width, to allow wheelbarrows to pass each other. To this, connected to and run by the main power, are built several elevators. At the foot of the elevators are located the machines for sawing out the staves. The staves are sawed and thrown one by one upon this elevator, and by it carried to the platform and dumped into the wheelbarrows. We must pause before we go further to describe the new dry house. It is known as a "tower kiln," and is built to a height of about fifty feet; 2 x 4s laid on the side are the material used. Of these tower kilns there are but two in the United States, the one at Troy and the one lately built by the Menasha Wooden Ware Company. This tower contains twenty apartments, each with a trap door at the top through which to dump the unseasoned staves. These apartments are filled to the brim by the wheelbarrows, which have in turn been filled by the elevators to the adjoining platform. Now comes the process of drying, which is the main advantage of the vast improvement, as it does not necessitate the use of fire in immediate connection with the dry house. A huge circular fan of about ten feet in diameter is cooped up in an iron encasement. This fan is so built that in its revolutions it draws in air. Before the aperture to admit this air is running up and down 4,000 feet of heated inch pipe that is heated by steam from an engine in connection. The heated air thus drawn in by the fan is forced by the same power in under and up into the dry house, the floors of which are iron with numerous holes through them to admit the heat. The time occupied to properly season the staves for use by this new method is from three to six days, or about one-half that occupied by the old. No fire is thus brought into the immediate vicinity of the dry house, and the ease with which the whole operation is performed is remarkable.—*Coopers' Journal.*

Stones that will Swim in the Human Eye.

Eye-stones are really portions of the covering of certain shell fish. They are found at the opening of the shell, and serve to close the entrance when the animal draws itself within. They are of various kinds, but those used as eye-stones are hard, stony bodies, about the size of split peas, one-third to one-sixth of an inch in diameter, a little longer than broad, having one surface plane and the other convex.

When they have been worn by the action of the sea, they are very smooth and shining. Like other shells, they are composed of carbonate of lime. When placed in a weak acid, such as vinegar, a chemical change takes place, carbonate acid gas is given off, and in its escape produces the movements which are popularly supposed to show that the stone is "alive."

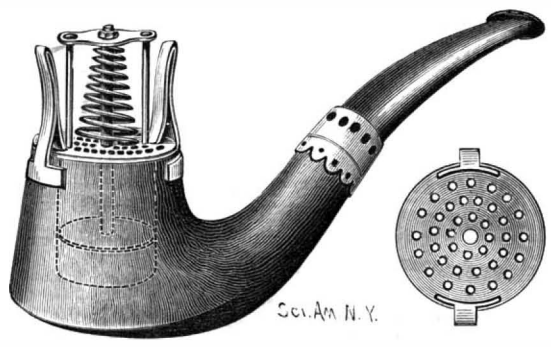
When one of these stones is placed under the eyelid, at the outer corner, the natural movements of the lid in winking push it gradually toward the inner side, and when it comes in contact with the mote which is causing the irritation, this is carried along and finally expelled with it. The belief that such stones have a peculiar detective power, and move about in the eye until they find and remove the irritating substance for which they have been "sent," has no foundation in fact.

It is interesting to know that in the lining membrane of the stomach of the crawfish there are found small bodies which go under the name of "crab's eyes," and look not unlike the true eye-stones. They have sometimes been mistaken for them, and presumably would serve a similar purpose.

THE tide tables for the Atlantic coast of the United States, together with 206 stations on the Atlantic coast of British America, for the year 1891, published by the United States Coast and Geodetic Survey, are now ready for issue, and copies can be obtained by addressing the office at Washington. Price twenty-five cents.

AN IMPROVED TOBACCO PIPE TOP.

The illustration shows an attachable top or cover for a pipe, by means of which, also, the tobacco may be pressed down into the pipe bowl without removing the cover. It has been patented by Mr. Martin L. Schoch, of New Berlin, Pa. The small figure shows the bottom of the cover, which has numerous perforations, and is provided upon opposite edges with upwardly curved spring arms, doubled over and extending down to clasp the outer edge of the bowl, in such way that the cover may be conveniently attached or removed. A rod having on its lower end a stuffer plate is vertically movable through a hole in the center of the cover, as indicated by the dotted lines, there being a finger piece removably attached to the upper end of the rod. The finger piece has ears at each end adapted to slide upon guides extending upward from the top of the cover, a pyramidal spiral spring being coiled around the rod



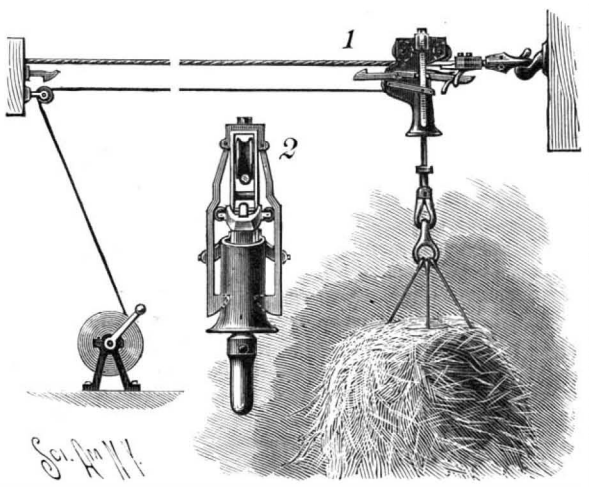
SCHOCH'S TOBACCO PIPE TOP AND STUFFER.

between the guide arms, whereby the stuffer plate will be held in elevated position except when it is pressed down to pack the tobacco in the bowl.

AN IMPROVED HOIST AND CONVEYER.

The illustration represents a device adapted for use in elevating and transferring heavy substances, carrying the load horizontally to any desired point and lowering it. It has been patented by Mr. Oren W. O'Dell, of Fenton, Mich. Fig. 1 is a side view of the device locked to receive a load, Fig. 2 being a front elevation of the carrier, which consists mainly of a hollow shell, near the top of the upper section of which are journaled two grooved pulleys, while on each side is pivoted the upper end of a spring-actuated arm, which is carried downward and has a latch-head on its lower end.

The latch-heads are normally held within the lower tubular section of the shell by springs. A horizontally-extending centrally-slotted latch-lever embraces and is pivoted to the central portion of the shell, and in the forward wall of the slot is pivoted a trip-bar. In the central section of the shell, beneath a spring, which normally retains the latch-lever in contact with the tubular lower section, are two grooved pulleys over which the hoisting rope passes. The hoisting or trip sleeve has a link at its lower end to which the load is



O'DELL'S HOISTING AND CONVEYING DEVICE.

attached, above which is a peripheral flange adapted for contact with the latches on the side arms pivoted at the upper end of the carrier. The track-rope employed in connection with the device is rigidly secured at both ends, where also keepers are located to engage the latches of the horizontal latch-bar. The hoisting rope, attached to the hoisting or trip sleeve, is passed up through the lower tubular section of the carrier, over one grooved pulley and under the other within the carrier, and parallel with and beneath the track-rope, and thence to and over the sheave at the delivery end, to the operating drum. When the hoisting or trip sleeve, with its attached load, is carried upward within the tubular section of the shell, its peripheral flange bears against a trip-rod, by means of which the horizontal latch-lever is disengaged from the keeper and the carrier is free to travel on the track-rope to the delivery point, which is effected by the further winding of the hoisting rope. The other latch of the horizontal latch-lever is then engaged by the keeper, and by such contact the spring arms at the side are pressed outward, releasing the hoisting or trip sleeve and permitting it to drop to deliver the load.

The Specification of Letters Patent.

The late Judge Grier of the United States Supreme Court says:

"There are few things more difficult, even for well educated and practical lawyers, than to describe a new invention clearly, and point out the principle which distinguishes the subject of it from all things known before. As inventors are rarely experts, either in philology or law, it has long been established as a rule that their writings are to be scanned with a good degree of charity.

"But it is easy to abuse this liberality to the purpose of fraud.

"The public has rights to be guarded also, and these exact that the patentee's specification shall set forth his invention so fully and definitely that it cannot be readily misunderstood." (French *vs.* Rogers, vol. i., Fisher's Patent Cases, p. 138.)

The importance of clearly and correctly describing the use and operation of the invention is well set forth in the opinion of a patent law judge many years ago:

"The intention of the inventor, so as to effect the object designed, is to govern the construction of the language he employs. Inventors are not always educated or scientific men. Some of the most useful inventions have sprung from an illiterate source. Genius is not always blessed with the power of language. Courts look to the manifest design, in order to remove any ambiguity arising from the terms employed. But this ambiguity must not be such as would perplex an ordinary mechanic in the art to which it applies." (Page *vs.* Ferry, vol. i., Fisher's Patent Cases, p. 298.)

But the comparatively recent words of Judge Miller, now of the Supreme Court of the United States, are like "apples of gold in pictures of silver" to the inventor; they shine out in the inventor's firmament like the bright moon and stars to the lonely people under the splendors of the brilliant arctic night; they contain the most important information and advice to inventors, in words which are, at once, glowing, concise, beautiful and forcible:

"The growth of the patent system in the last quarter of a century in this country has reached a stage in its progress where the variety and magnitude of the interests involved require accuracy, precision, and care in the preparation of all the papers on which the patent is found. It is no longer a scarcely recognized principle struggling for a foothold; but it is an organized system with well-settled rules, supporting itself at once by its utility and by the wealth which it creates and commands. The developed and improved condition of the patent law, and of the principles which govern the exclusive rights conferred by it, leave no excuse for ambiguous language or vague descriptions.

"The public should not be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights.

"The genius of the inventor, constantly making improvements in existing patents—a process which gives to the patent system its greatest value—should not be restrained, by vague and indefinite descriptions of claims in existing patents, from the salutary and necessary right of improving on that which has already been invented.

"It seems to us that nothing can be more just and fair, both to the patentee and the public, than that the former should understand and correctly describe just what he has invented, and for what he claims a patent." (Merrill *vs.* Yeomans, vol. xi., Patent Office *Gazette*, p. 970.)

And the late Judge Grier, after a wide experience in patent legislation, rings out these solemn words of warning:

"The courts always labor to protect a man when they clearly see that he has made a good invention but has got among a set of bungling fellows to draw his patent; and many a time we have had to stretch almost our consciences to help through a good invention against a bad description drawn by some blockhead.

"The difficulty has been that mechanics did not understand law, and lawyers did not understand mechanics."—*The Practical Mechanic.*

A Warning to Inventors.

The *Manufacturer and Builder* thinks it does not require much sagacity to take the *Official Gazette* of the Patent Office, which costs $5 per year, and write letters each week to several hundred patentees throughout the country, telling them you can sell their patent, and then extracting fees by various of the well known methods of swindling; but it does call for an amount of rascality that has hitherto been considered a kind of safeguard or restraining influence in these matters. The plausible letters that can be written throw a large percentage of inventors off their guard, and the scheme must be successful, as it still goes on.

We can do no more than warn all who receive such communications to throw the letters or circulars into the fire.

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Correspondence.

Kerosene and Spiders.

To the Editor of the Scientific American:

Did you or any of your readers ever hear that kerosene attracted spiders? I have a large can of kerosene in a shed, and under the faucet, to catch any drops in drawing the liquid, is a tin. Repeatedly I have found this kerosene tin filled with spiders, large and small, which have been drawn to it, apparently, for they are not to be seen in the room elsewhere. I should have supposed the smell of kerosene would repel any insect, but these spiders come to the tin as if it were a trap for them, and, of course, find their death in it. K.

Newburyport, Mass.

Covering the Sun's Disk.

To the Editor of the Scientific American:

In the very interesting article on optical illusions in the SCIENTIFIC AMERICAN of May 17, 1890, quoted from Mr. Liverseege's paper before the Midland Counties Chemists' Association, England, one slight inaccuracy occurs which I beg leave to call attention to. He queries, "What is the diameter of a sphere which just hides the sun's disk at a certain distance, say ten feet? As far as I can answer the question I should say between three and four inches." Mr. Liverseege evidently had not tried the experiment, which is very easily done, taking the full moon's disk, which is substantially of the same average apparent diameter as the sun's. The problem is also one of simple calculation. The sun and moon subtend about half a degree of arc at mean distance (32 minutes). Half a degree of a circle of 10 feet radius $= \frac{2\pi r}{2.360} = \frac{2 . 3{\cdot}1416 . 10 . 12}{2 . 360}$ $= 1{\cdot}0472$ inches, just about the diameter of a silver quarter dollar. At arm's length—say 2½ feet—a buckshot 0·26 of an inch in diameter (about ¼ inch) fully covers the sun's or moon's disk, as any one may demonstrate by practical test. HENRY H. BATES.

U. S. Patent Office, Washington, D. C., May 23, 1890.

Submarine Navigation.

To the Editor of the Scientific American:

In your issue of May 17, which is just to hand, you have given a very interesting account of the experiments which were successfully carried out with the submarine boat Goubet. In your account you state that these experiments proved that the Goubet is able to come to a rest at any desired depth, and to maintain that position for any desired time, and you further state that it is impossible to say how this paradox is realized by the Goubet, and that it is a secret between the inventor and the government.

I do not lay claim to any knowledge of the process whereby this result is achieved by Mr. Goubet in his submarine boat, but I can easily give you a description of a process whereby the result can be produced. Nearly ten years ago I wrote a book for amusement somewhat similar to "Looking Backward," that is to say, it was supposed to be an account of a theoretical socialistic government, but I never took the trouble to have the book published. I believe the manuscript has been destroyed, but I remember that among many other inventions described in the book, I had given a description of a submarine boat which had the power of remaining at any desired depth for any length of time. The process by which this result was achieved was a very simple one, and depends on a few well known natural laws. A body that is immersed in water will have a tendency to rise if its weight is less than the weight of the water displaced, and a tendency to sink if its weight is greater than the weight of the water displaced. While water is not incompressible, yet its compressibility is so slight that the weight of a given bulk of water is practically the same at the surface of the sea and one hundred feet beneath the surface, and therefore a body that commenced to rise or fall, by reason of its weight being smaller or greater than the weight of the water displaced, would continue in the same direction for a very considerable distance.

If a body that is exactly equal in weight to the water displaced be increased in size or decreased in weight ever so slightly, it will tend to rise, and a slight decrease in size or increase in weight will tend to make it sink. While the depth of a body in water could not be determined or regulated by the infinitesimal reduction in the bulk of the water displaced, yet it can be easily controlled by the fact that the pressure of the water increases rapidly with the depth. At the surface of the sea the pressure is about 14 lb. to the square inch; at a depth of a little over thirty feet, it is 28 lb., and at 100 feet it would be about 60 lb. per square inch. A difference in depth of one foot makes a difference in pressure of about seven ounces. A delicate appliance, which could be easily made, inside the submarine boat, enabled the pressure to be shown in quarters of a pound upon a dial with a movable needle. A movable handle, sliding round the edge of the dial, had two points separated by a distance equal to a quarter of a pound division on the dial, and which were in such a position that the movable needle just touched them. Upon the needle touching one point it completed an electrical circuit, and so started a pump into operation to empty a tank, and in that way lessen the weight of the vessel. If the vessel was in almost perfect equilibrium, a few ounces of water ejected would be sufficient to start it in an upward direction. This would be immediately checked by the needle on the dial breaking that circuit, and completing another by touching the other point, so stopping the pump and opening a small aperture for the admission of water into the tank. The vessel would therefore continually rise and fall automatically through a distance of not more than a foot or eighteen inches at most. By means of the sliding handle the depth could be immediately altered to any desired extent, and the movable needle would then keep the vessel automatically at that depth as long as desired.

Instead of the completion of the circuit on the dial causing the admittance of water to sink the vessel, or the operation of the pumps to raise it, on the principle of increasing or decreasing the weight of the vessel, a similar result could be produced by decreasing or increasing its size. A cylinder with one end open to the water, and with a piston strictly water-tight sliding in it, worked by an electrical machine, would produce the same result. Drawing the piston back a few inches would decrease the size while maintaining the weight, and the vessel would therefore sink; while forcing the piston out a few inches would increase the size, and so make the weight of the water displaced greater than the weight of the vessel, and would, therefore, cause it to rise. The dial would keep the piston moving slightly backward and forward, and therefore keep the vessel within very narrow limits of the desired depth. This may or may not be the method employed by Mr. Goubet for maintaining his submarine boat at any desired depth, but it certainly is simple, practicable, and sure. HAROLD ROWNTREE.

Westport, Mo.

Lassar's Treatment of Baldness.

The treatment recommended by Lassar, of Berlin, for alopecia pityrodes and alopecia areata has been attended with some brilliant results. According to Dr. Graetzer's article in the *Therapeutische Monatschrift*, but few cases resist the treatment, and after a few applications the downy sprouts may be seen. The following procedure is to be repeated daily:

1. The scalp should be lathered well with a strong tar soap for ten minutes.

2. This lather is to be removed with lukewarm water, followed by colder water in abundance; then the scalp is to be dried.

3. A solution of bichloride of mercury, 1 to 900, the menstruum being equal parts of water, glycerine, and cologne or alcohol, is to be rubbed on.

4. The scalp is then rubbed dry with a solution containing beta-naphthol, 1 part, and absolute alcohol, 200 parts.

5. The final step in the process is an anointing of the scalp with an unguent containing 2 parts of salicylic acid, 3 parts of tincture of benzoin, and 100 parts of neatsfoot oil.

This treatment should be persisted in for a period of six weeks or longer. Lassar, who, by the way, is the secretary-general to the International Congress of this year, has done much to awaken the profession from the lethargic state into which it had fallen in regard to the treatment of alopecia. He is reported to have treated a thousand cases in the manner described.—*N. Y. Med. Jour.*

A Collision with an Iceberg.

The Beacon Light, an English steamship for carrying oil in bulk between Liverpool and New York, recently arrived here in a somewhat damaged condition, having been in contact with an iceberg.

The Beacon Light was a new vessel just off the stocks when she sailed. She was built for the oil trade, and had, among other improvements, a large electric light for the purpose of searching in fog. The voyage was a favorable one until the evening of May 12, when it became foggy. At midnight, when the watches were changed, the temperature of the water was found to be 54 deg. This did not indicate the presence of ice in the vicinity, but, as the fog had grown denser, Capt. Elliott ordered the engines to be slowed down.

Twenty minutes after midnight the lookout sprang down upon the deck and cried out: "There's something white ahead!"

The captain hurriedly telegraphed to the engineer to reverse the engines. The helm was put hard to starboard. The ship had answered her helm, and began to swing her head quickly around to port. Then came a shock and a crash, and the terrified sailors saw a great avalanche of broken ice tumbling down upon the forecastle head and pouring over upon the forward deck. The bluff of the steamer's bow had struck the foot of the ledge. It was a glancing blow, and threw the Beacon Light fairly over upon her beam ends. Great masses of ice, which had been knocked from the ledge, fell into the ocean, and, after sinking a short distance, came up rapidly and dealt telling blows upon the side and bottom of the vessel.

The ship remained on her beam ends but a moment, and then quickly righted. She now began to feel the effects of her reversed engines and backed slowly away from the iceberg, on which the searcher was still pouring its light and which appeared about six hundred feet long and ninety feet high at the peaks. The captain found that the vessel was not sinking, although she had evidently sprang a leak. The air was heard escaping from one of the tank compartments of the hold which had been empty, and he immediately had all of the cocks of the tanks shut and the plugs screwed in. The pumps were started, and it was found that these got rid of the water much faster than it poured into the hold, Captain Elliott was satisfied that the vessel was still seaworthy and proceeded on his course.

The Beacon Light was built in the yard of Sir William Armstrong & Co., at Newcastle, and registers 2,107 tons. Her dimensions are: Length, 332 feet; breadth of beam, 40 feet; and depth of hold, 28 feet. She can make thirteen knots an hour at a comparatively small outlay of coal.

Grapes for Raisins.

The California raisin industry is one of our most profitable, promising, and rapidly extending specialties. Not only so, but the raisin is winning wide reputation for our State in distant parts, and our raisin districts, especially in the San Joaquin valley, are enjoying a good share of the influx of population. A single branch of production which made an outturn last year of one and a quarter million 20 pound boxes, or in round numbers 25,000,000 pounds of dried fruit, and which bids fair to increase this amount this year, possibly 33 per cent, is naturally attracting much attention. This interest is also stimulated, no doubt, by the fact that in spite of this production and the foreign product as well, there is this year a great shortage in the world's supply of raisins. The outlook is that those who have been planting raisins so resolutely and confidently during the last few years will find themselves luxuriating in generous returns this year if no unfavorable influence prevents the realization of present crop promise.

In winter are seen the vines in their regular rows correctly aligned from any point of view. The foliage has fallen, the canes have been pruned back to a few buds, and nothing appears to the casual observer but gnarly stumps with crests of pronged spurs, the old bark black, ragged, and uninviting, the ground covered with rubbish of dead leaves and brush and clods. Such is the aspect of a vineyard until the winter rains start the growth of verdure along the rows, then follow the plowing and harrowing, or cultivating, and the sorry vine stumps are surrounded by an even surface of well pulverized soil; soon the vine feels the warmth of the spring sunshine, the foliage starts, the gnarly, spurred head of the vine is hidden beneath a tuft of crisp, delicate leaves; then, if frosts forbear, out shoot the canes with twining tendrils, the vine stump is lost to sight, the field becomes an expanse of beautiful green mounds. Back and forth go the cultivators, each time the pathway of brown soil becoming narrower, until at last vine links tendrils with vine, and the field is a sea of green; vine stump, brown soil, everything is concealed beneath the dense mantle of verdure. Such is the California vineyard at midsummer. In young vineyards there will be protruding stakes and bare patches of soil, but in the old vineyards there is neither sign of stake nor trellis. The vine pruned to support its own weight, except such as it can distribute over the surrounding soil, needs no support. There is nothing handsomer in the midsummer landscape than the green of the vineyard contrasting with the browns and yellows of the grain fields or the unimproved hillsides. Orchards are green as well, but the vine has a density of foliage and a uniform verdure which can be selected as far as the eye can perceive.

As the summer shades into autumn, the scenes in the vineyard change. The heavy clusters of ripe grapes are gathered, spread upon wooden trays, and exposed to the clear sunshine and warm dry night air of the interior valleys of California. As the available space between the vines does not always accommodate the fruit, all surrounding spaces are employed. The avenues around the vines are spread with trays, and the banks of the irrigation ditch are also covered.—*Min. and Sci. Press.*

Artificial Gutta-Percha.

Dr. Purcell Taylor, of London, claims to have succeeded in making a new insulating material, having all the properties of gutta-percha, but with a higher dielectric resistance. The new substance, which is to be called "purcellite," is, according to the writer, very tough and elastic. A piece of iron covered with it, he states, was hammered out flat, then bent and twisted until it broke, without even cracking the covering. The cost, it is added, is only about 1-40 that of gutta-percha. It may be made any color, and either flexible or rigid.

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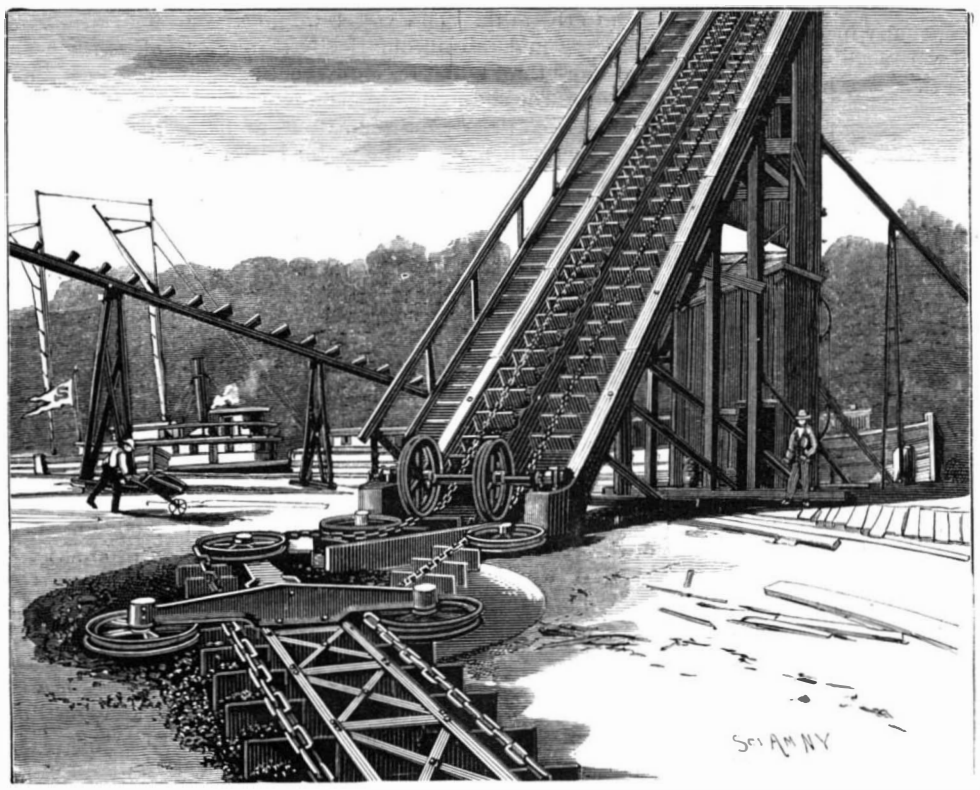
COAL HANDLING MACHINERY AT THE RONDOUT YARD OF THE DELAWARE AND HUDSON CANAL CO.

A coal elevating, trimming, and reloading apparatus has recently been erected on the dock of the Delaware & Hudson Canal Co., at Rondout, N. Y. The company have possession of an artificial island in the middle of Rondout Creek, which is entirely devoted to the storage of coal. It is surrounded by a bulkhead, and can accommodate a very large number of vessels. The D. & H. canal enters the upper end of the creek, and barges direct from the anthracite coal regions during the season are continually arriving. Some are discharged at the island, others are sent on without breaking bulk to customers.

The coal handling plant which we illustrate embodies the apparatus of the Dodge Coal Storage Co., of Philadelphia, Pa. It may be resolved into three parts: The elevators, which discharge the boats, emptying them of their cargo; the trimmers, which take the coal from the elevators and deposit it upon the heaps; and finally the reloaders, which transfer coal from the heaps to the holds of outgoing barges or other vessels.

The elevators at present in use are floating structures, constructed on the general lines of a grain elevator. These elevators have a capacity of handling about 5,000 tons of coal a day, and were constructed for this company by the Chase Patent Elevator Co. of Fall River, Mass. An endless chain carrying buckets is kept in motion around a movable drop frame, which is raised or lowered by tackle. The frame is lowered endways into a vessel's hold, and at once makes its way through the coal until it reaches the bottom of the hold, upon which the base of the frame sets. The string of buckets carry up coal continuously, while the frame seeks its bearing and rapidly raises it to the upper part of the elevator. Here it is received in pockets and is weighed. There are two weighing hoppers, so that the elevator need not be stopped while the final adjustment of the weights takes place. It is then delivered through a short chute to the foot of the coal trimmers.

In the lower cut on this page we illustrate an improved elevator which is shortly to be tested. This presents several distinctive features, which are shown clearly in the drawing. The endless chain of buckets is retained, but the elevating arrangements are modified so as to permit it to extend outward from the pier line a sufficient distance to reach the center of a boat. The bucket chain is worked from a fixed countershaft, and the buckets perform a double role, that of elevating and subsequently of transferring horizontally the coal by drawing it along a trough. The diagram shows the easy adjustability to height of this new type of elevator, which it will be observed is to be established upon the pier.



THE RELOADER SHOWING METHOD OF RAISING AND DELIVERING COAL INTO THE BARGE.

By the elevators of whatever system, the coal is lifted from the boat's hold and passed through a chute to the base of the trimmers. During this passage it is screened, a portion of the bottom of the chute being formed of open work for this purpose. While much of the discharging is done without any manual assistance, a gang of trimmers is kept in the boat, who shovel coal down to the mouth or lower end of the elevator frame.

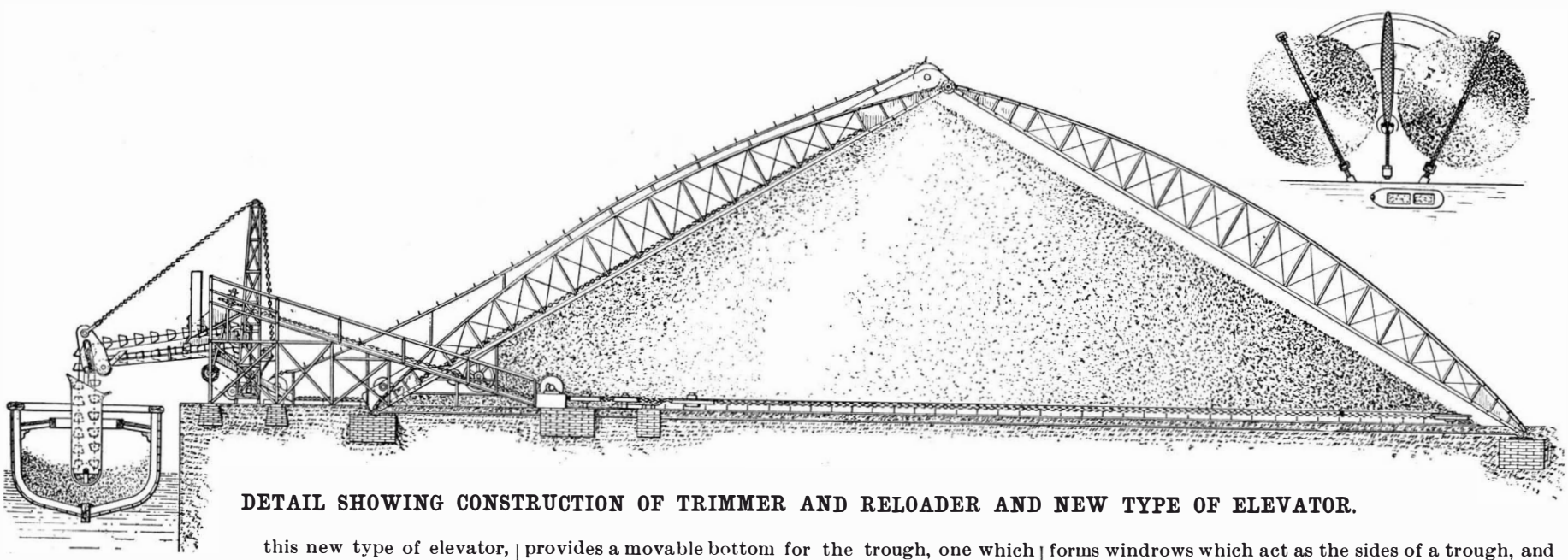
Having reached the dock, the coal has next to be raised and formed into piles. For this purpose trussed shear frames are used, whose general features of construction and arrangement are shown very clearly in the engravings. Two trusses are used for each pile of coal. They are joined at the top, or apex, by a large pin passing through them, forming a species of hinged joint. At the lower ends they are based upon masonry and piling, and in addition two tension rods run across the yard from the base of one truss to that of the other, forming a tension member or chord. They are steadied by guys fastened to the apex. An endless chain is arranged with pulleys so as to travel up and down in two troughs, going up in one trough and descending in the other. These troughs are carried by the truss on one side of the pile, termed the conveyer truss. At intervals on the chain square plates of iron or floats are attached that extend down from it and scrape along upon the bottom of the lower trough. The other trough lies along the upper member of the truss and is more properly a guide, the plates occupying the reverse position in it. Coal thrown into the lower trough will follow the motion of the chain. The floats fit the trough approximately only. The bottom of the trough up which the coal ascends is a steel band or ribbon 12 in. wide and ⅛ in. thick. At its lower end it is attached to a drum, around which it can be wound, while to its upper end a wire rope is attached by a shackle. This rope runs up the truss under the center of the working trough, and is carried around a pulley at its upper end, then running down to the base of the frame, being contained within a gas pipe on its downward course, and below is attached to a windlass. This provides a movable bottom for the trough, one which can be drawn up as far as desired, or which can be lowered, always closing the bottom of the trough for the extent which may be used. The lowering operation consists in feeding out rope from the windlass and winding the ribbon in upon its drum, so as to keep it tightly stretched. The reverse operation draws up the ribbon and closes the trough for a greater or less portion of its length. In using the apparatus for trimming coal the following is the sequence of operations:

The chain with its floats is put in motion. The steel ribbon is drawn up to a point a little beyond the proposed base of the pile, one point of which always coincides approximately with the lower end of the truss. Coal is now discharged from the elevator chute to a small pocket, and falls between the floats at the lower end of the conveyer truss of the trimmer, near the ground level. The floats actuated by the chain draw the coal away through the trough. Acted on by the moving floats, the coal is carried up the inclined trough until it reaches the end of the ribbon. Here it falls through the trough, now bottomless, and the formation of a coal heap begins. At this point, which becomes the apex of a cone of coal, the mass rapidly rises, and in a few minutes the ribbon has to be still further advanced. In this way a conical heap is formed. As it rises it acquires greater area of base, and the ribbon is shifted less frequently. The same operation continues until the heap reaches the apex of the trusses. The two trusses are placed as nearly as possible at the angle of repose of coal, and it is surprising to see how closely the proper angle has been obtained. This angle is about 50° at the point of juncture and abuts at an angle of about 30° with the ground.

The coal reloaders work on the same general principle. One of them is shown complete in the center of the upper front page engraving, and the pivoted end of the truss and the elevated path of the delivery end is shown in accompanying cut. An endless chain, armed with floats, is carried around a truss, which in this case lies on its side upon the ground, and which is supported by wheels which run on circular tracks. The truss is pivoted at one end, and by means of a windlass worked by hand, which operates the chain running along one of the tracks, the great truss, which may be several hundred feet in length, is swung around in the arc of a circle, against the base of any pile which it is desired to reload into a vessel.

As the chain approaches the edge of the wharf, it is carried up so as to form an elevator and feed the coal into hoppers. From these hoppers it is drawn into pockets for weighing. It is weighed and then discharged through a chute into the hold of a vessel. Here also it is screened. The reloader differs from the trimmer, as far as its operations upon the level ground are concerned, in having no trough. In operation, when it is swung in against the base of a heap, the floats cut into the coal and scrape it away from the base of the heap and bear it on to the scales and loading chute.

A gang of men is in attendance, who regulate the flow of coal in order that it may not be too rapid, who keep the tracks clear, so that the reloader can be swung in against the heap, and who operate the windlass as required. Although the floats on the level ground are not confined within a trough, the coal itself forms windrows which act as the sides of a trough, and hold the moving coal perfectly in place. Where it elevates the coal, troughs are provided.



DETAIL SHOWING CONSTRUCTION OF TRIMMER AND RELOADER AND NEW TYPE OF ELEVATOR.

This gives a general idea of the operations of the three parts of the plant. In the outline drawing already alluded to, the elevator, trimmer, and reloader are all shown in their proper relations to each other. At the base of the conveyer truss is shown the drum on which the steel ribbon is wound. Along the base of the heap the reloader chain can be traced, which afterward ascends the inclined plane on the left side of the cut. The small plan shows the formation of two coal heaps with the reloader between them, resting on the circular tracks. As the latter has to serve for two heaps,

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the machinery is arranged to drive the chain in either direction.

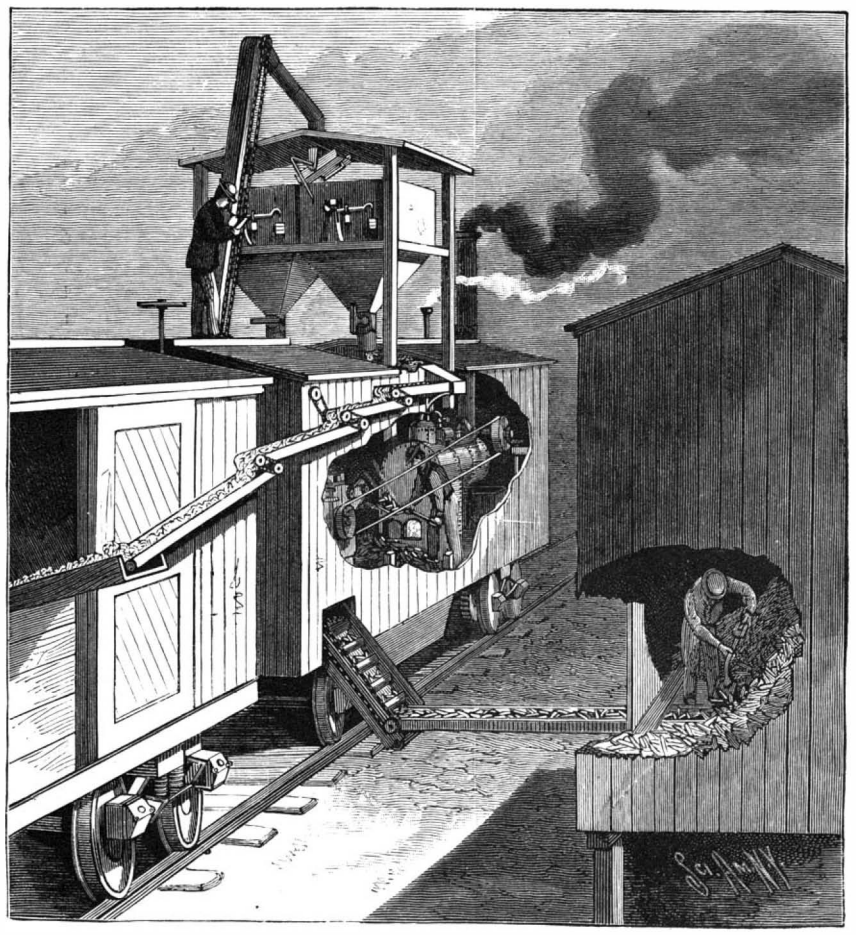
As regards other details, the chains of the trimmers and reloaders are driven by sprocket wheels. This would not answer for the elevators of the type now in use, as they have to be raised and lowered. A short endless chain, driven from a sprocket wheel, lies within the main bucket chain. Teeth are attached to its links which, catching the links of the bucket chain, drive it at whatever level the frame may be set. Tension screws are applied to the bearings to keep the chains stretched. Between each pair of links where they would otherwise come in contact with each other is a bearing block of malleable iron that prevents wear and supplies a more fixed journaling for the end of the link.

The capacity of the yard is placed at 120,000 tons. There are six trimmers. The largest pair, 74 feet high and 260 feet spread, can form a pile of 30,000 tons capacity. There are three reloaders, one for each pair of trimmers. Five elevators are at present in use. In general the conveying machinery can dispose of two or three tons a minute. One important feature is that the coal is never dropped more than a foot, so that the formation of slack is avoided. Two engines, aggregating about 200 horse power, drive the trimmers and reloaders, of course not all at once.

The large capacity of the yard provides an element of security against strikes or other interruptions in the coal supply. It represents the distributing point for anthracite coal by water in all directions, while coal may be sent by barges across the Hudson River to be transferred to other railroads. Improved coal-handling machinery makes such transfer economical.

AN IMPROVED ELEVATOR CAR.

The illustration represents an elevator car designed to facilitate the handling, transferring, and stowage into cars of grain that has been deposited in cribs or granaries along the line of a railway, affording an elevator privilege at every station in the country upon roads employing such cars. It has been patented by Mr. James E. Snevely, of Chetopa, Kansas. The car is divided into three compartments, one of which accommodates a boiler and engine, the smoke stack being hinged to fold down upon the car roof when the car is in transit. In the second compartment is a frame, adapted to be raised by chains and windlasses, or lowered so that its top will be flush with and form a portion of the car roof, the windlasses being located in the third compartment. The framework supports hoppers connected with scale beams so arranged that the weight of the grain may be read by an attendant upon the car roof, and the hoppers have discharge orifices to a conveyer belt that leads to a chute extending outward through the side of the car, where it is connected with such number of conveyers as may be necessary to reach the car that it is desired to load. A bucketed elevator is provided to transfer to the car the grain or corn to be handled, the elevator delivering directly to the receiving trough of a combined sheller and separator, and in connection with this elevator is a conveyer driven by a chain connection and arranged to be passed beneath the flooring of a crib or granary. This elevator is designed to have a capacity of three thousand bushels per day, while requiring the labor of only four men to operate it.



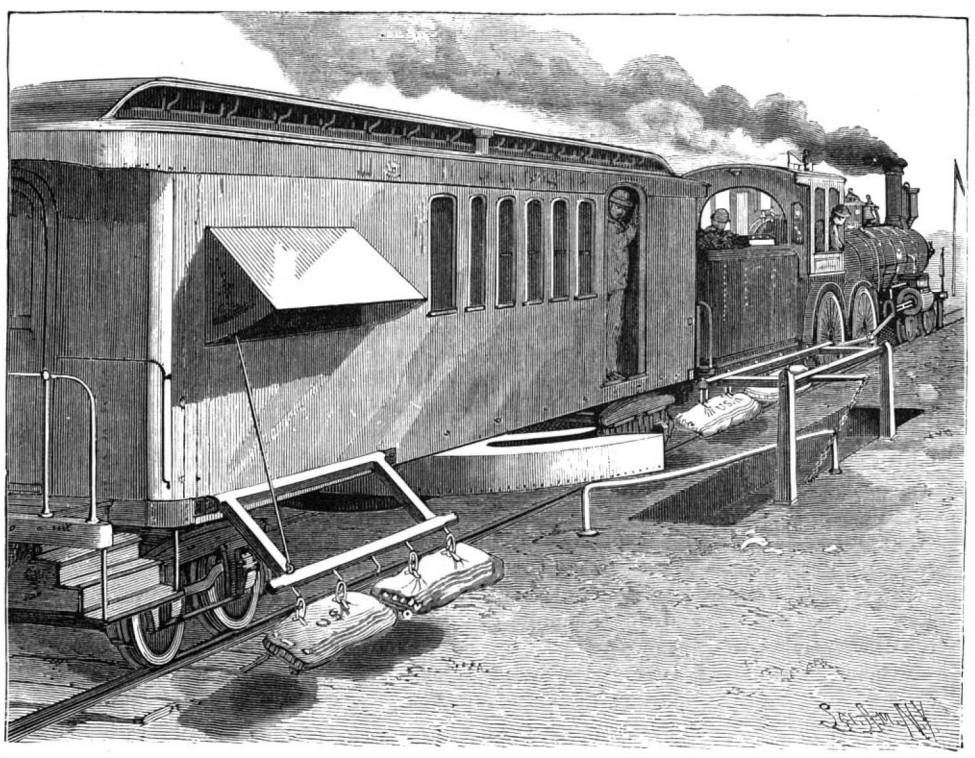
SNEVELY'S ELEVATOR CAR.

Presence of Mind in a Parrot.

A dispatch to the New York *World* from St. Louis says: Several days ago a thief entered the house of Dr. D. Morrow, at No. 308 Jefferson Avenue, and, choosing between a sideboard full of silverware and a red-tailed gray parrot in a gilded cage, took the latter. The error of his preference was soon made manifest to him when the burglar reached the street, for the parrot set up vociferous cries of "Stop thief!" and whistled up all the dogs in the neighborhood. The thief stood this as long as there seemed the faintest show of escaping in spite of it, but at last, as men, boys, and dogs closed around him, he threw down the cage and nimbly sped away, but was soon arrested.

AN IMPROVED MAIL CAR.

The illustration represents a novel construction designed to facilitate the delivery of mail bags from a moving train, and also the taking up of mail bags by such a train, which forms the subject of several patents issued to Mr. William H. Elliot, of No. 499 Eighth Street, Brooklyn, N. Y., to whom those desiring further particulars should apply. The receiver consists of a cylindrical chamber located below the car floor between the front and rear trucks, and arranged upon a vertical axis, the chamber having at one side an entrance spout, which, by turning the chamber on its axis, will be swung out at the side of the car. This spout may be joined to the circular chamber by a hinge, if preferred, when it would be swung out independently of the inner chamber. In the top of the spout is a slot, adapted to engage and release the hooks by which the filled mail bags are held upon a properly arranged delivery bar, the bags being then carried into and around the circular chamber until their momentum is lost by friction. The station delivery bar, as shown, is hinged to standards at a short distance from the side of the track, and a chain or cord extends outward from the bar to a fixed support, whereby the bar may be readily held at the desired height. The station receiver is shown in the form of a rectangular box sunk at the side of the track, and extending partly over it is a curved rail adapted to engage the hooks of the mail bags held upon a delivery bar swung out from the side of the car. This car delivery bar is adapted to be swung out and in by means of a cord passing to a drum inside, simple connections with such drum also affording ready means for turning outward the spout of the circular chamber, this drum, with the crank or lever by which it is operated, being the only portion of the mail receiving and delivering apparatus which takes up any space within the car proper. The curved bar located at or near the platform of the station releases the bags from the hooks on the car delivery bar, and they fall automatically into the box sunk under the track, where they are in no danger of being carried by momentum under and being crushed beneath the wheels of the cars, as sometimes happens when they are thrown loosely on the platform of the station. The bags may be delivered by the car and collected simultaneously, as the operations of delivery and collection do not in any way interfere with each other.



ELLIOT'S MAIL CAR AND DEVICES FOR RECEIVING AND DELIVERING MAIL BAGS.

African Indigo.

The production of indigo in West Africa, says the *Deutsche Wollen Gewerbe*, is almost entirely in the charge of women, and its extent depends upon the manufacture of cotton goods by the natives. How important this industry is can be judged from the fact that millions of meters of cotton fabrics are annually manufactured, upon the primitive hand looms of the country, for the domestic consumption and for export. Especially extensive is the export of these goods to Brazil, where they have become very fashionable and are particularly used for decorative purposes. The most popular color for these fabrics is the blue derived from indigo. A commission which, in 1886, was sent by the government from Lagos to Yoruba, to report on the culture of indigo, stated that in the city of Ibadan, with a population of about 150,000, nearly everybody is clothed in blue stuffs. Upon the banks of the Gambia River this industry is carried on very extensively. The indigo is there known under various names, as "Carro" in Mandingo, "N'Gangha" in Volof, "Elu" in Yoruba, "Suini" or "Luni" in Houssa, while the plant is called "Baba." In the valley of the Niger River the pure precipitate is produced, in which form alone the indigo has a market value. In Gambia and Yoruba it is found in the form of balls of rotten leaves, mostly mixed with cowdung, and without commercial value outside the country. The process of extracting the indigo is as follows: In an earthen vessel of about 60 quarts capacity the leaves are steeped and thereby an extract produced, which is fermented; then the liquid is poured off and exposed to the action of the air. When the precipitation takes place and all the dyestuff has settled to the bottom of the vessel, the supernatant liquor is poured off, the pulverulent precipitate mixed with a little gum and formed into small balls, etc. The materials to be dyed are steeped in the extract before exposing it to the air, and dried in the open air, which operation is repeated until the desired shade is obtained. For the production of stripes or of patterns in different shades of color, the material is sewed together where a lighter shade is desired, whereby the intensity of the blue is diminished.

Paper Matrices.

Paper matrices for making stereotype plates from type forms, used in newspaper offices, are prepared as follows: Make a jelly paste of flour, starch and whiting. Dampen a sheet of soft blotting paper, cover its surface with the paste, lay thereon a sheet of fine tissue paper, cover the surface with paste, and so on until four to six sheets of the tissue paper have been laid on.

The combined sheet thus made is then placed, tissue face down, upon the form of types, which are previously dusted with whiting, and with a brush driven down upon the types and thereon allowed to dry. The operation of drying is facilitated by having the types warmed by placing them upon a steam-heated table. A blanket is placed over the paper during the drying operation.

A WEAK galvanic current, which will sometimes cure a toothache, may be generated by placing a silver coin on one side of the gum and a piece of zinc on the other. Rinsing the mouth with acidulated water will increase the effect.

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Telephone Engineering.

In a recent paper on this subject read before the New York Electrical Society by Mr. John J. Carty, he says:

Telephony is not wholly confined to the study of electricity; a broad and comprehensive knowledge of the subject requires also some familiarity with the physiology of the human voice and ear and an intimate acquaintance with the science of acoustics. A telephonist should be a good deal of a physicist.

The phonograph is destined to form an important part of the telephone system of the future. At some time no doubt a phonograph may be inserted in a telephone line to act as a sort of "talk meter," recording all conversation which goes over it. I once thought of a curious use to which the phonograph might be put, that is, in transmitting speech through one of the existing ocean cables. I have no doubt that a cable could be designed which would enable us to talk direct to Europe. In such a cable the idea would be to have the capacity and resistance as low as possible. Perhaps if there were a cable ten feet thick, we might talk through it. With the present cables signals are transmitted so slowly that before one telephone vibration reaches its destination, another is piled in on top of it, and confusion is the result. Now, my idea was to first speak into a phonograph and then turn the cylinder at a speed no faster than the cable can take care of the impulses, and to have at the other end a phonograph, also revolving slowly (but not necessarily synchronously), upon which a record would be made. This second cylinder could then be revolved at the proper speed, and if all went well, the transmission of speech through an existing open cable would have been accomplished. It has been estimated from a microscopic examination of the word "Hello" on a phonograph cylinder that it contains sixteen thousand indentations. If this is true, it would be quicker to send the phonograph cylinder by mail than to rely upon the cable.

The radiophone of Prof. Bell involves the most delicate and complicated theories of interaction within human knowledge. By means of this wonderful instrument, as you all know, it is possible to telephone between distant points without the aid of a wire. The ether is used to convey the impulses. This instrument has not yet found its way into practical use, but must some day form an important part in telephone systems.

Telephone engineering is a science of the future. It is interesting on account of its possibilities rather than because of what has been accomplished. At the same time, the work which is daily being carried on by the system of the Long Distance Company shows that the plant of that company is unique among the engineering feats of the world.

Before the introduction of the telegraphs and railroads into this country it was doubtful if our union of States would be rendered sufficiently homogeneous to hold together; but steam and the telegraph have, up to the present time, enabled us to expand far beyond the conceptions of our forefathers and still remain the prosperous and united country that formed their ideal. Still, as our civilization becomes more complex, there is a demand for a more complete intimacy between the various portions of our body-politic, and the long-distance telephone comes in to meet this want and supplement the railroad, telegraph, and mail.

There is a possibility in connection with long-distance telephone service which has never before been pointed out, and that is its effect upon the language of our nation. As is well known, where people in different sections of a country rarely come in speaking contact with each other, there is a gradual change in the language which ultimately results in the formation of a dialect; and while the telephone can never compensate for those differences in speech which are due to climatic influences, it will be an important factor in preserving the uniformity of our language.

The telephone has never been used in a great war, but it is capable of martial application, perhaps not as important, but not less unique, than characterizes its use in time of peace. A short time ago, General Manager Hall, of the Buffalo Telephone Company, assembled in less than half an hour the entire Board of Trade of that city to attend a meeting on an important subject connected with their commercial interests, and which meeting could only have been called by the aid of the telephone. This should suggest to our military authorities its utility in the mobilization of the various State militia organizations. With a telephone in every block in every city in the land, it would be possible to assemble all of the State militia of this country in a few hours. In Germany, the telephone, like the telegraph and railroad, is controlled by the government, and telephone officials are assigned to a regular place in the field, to be taken on the commencement of hostilities.

Some time ago Mr. Preece made some experiments to determine the effect of the great Deptford 10,000 volt alternating current dynamo upon neighboring telephones, and he came to the conclusion that when this dynamo was working, all of the telephones in London would be interfered with, owing to their connection with the earth. At that time I pointed out that by means of a dynamo properly connected with the earth and a set of telephones a besieged garrison might communicate with a relief party by signaling through the earth itself. Similar signals might be sent with the aid of a telephone from a ship to the shore, or from one ship to another. In this connection a remarkable statement has recently been attributed to Mr. Preece, to the effect that the operation of the Deptford dynamo created disturbance in the telephones of Paris.

Microscopical Notes.

*Preservation of Algæ.**—Having been perfectly successful in preserving the color of many of our fresh water algæ, it may be that the same method would prove successful with desmids. My plan is simply to have a wide-mouthed bottle, with glass stopper, filled with distilled water, in which I have a number of pieces of camphor. When it is desired to mount the algæ, I place a portion of the same in some of this camphorated water, to which a few drops of glycerine have been added, in a watch glass. At first it will become a yellow lemon color, but after a few hours the original green returns in its full vividness, and then I at once mount in a shallow cell, with a portion of the fluid. *Draparnaldia plumosa* thus mounted, twenty years ago, is to-day as beautifully green as at first, and the chlorophyl seems to be unchanged.

Camphor water is made by placing a lump of camphor in distilled water and leaving it there for several days, or until the fluid acquires a strong camphoric taste. It is used for mounting certain delicate vegetable structures. Creosote water, used for the same purpose, is made by dissolving creosote in a mixture of one part of alcohol and thirty parts of water.

Methyl alcohol, alcohol and glycerine, alcohol and carbolic acid, glycerine and honey, and a thousand other mixtures have been suggested from time to time as media possessing real or fancied advantages for general or special mounting purposes, but an experience of nearly twenty years with glycerine, balsam, and dammar has convinced me that these are practically all-sufficient, save in very isolated cases, as for instance where a liquid with a very high refractive index is required for some special investigation.†—*The Microscope.*

Confectioners' Secrets.

"People think that we charge a great deal for putting ice cream in moulds," said a confectioner to a *Star* writer the other day, "but that is because they don't realize what a skilled and difficult labor it is. It does seem a high price to pay $2.50 for three pints of water ice—itself worth only 75 cents—in a shape. However, you will readily see that it is not excessive when I describe the elaborateness of the process. Suppose you order your three pints of cream in the shape of a hen, which is a comparatively simple one. I say you can imagine that it is merely necessary to squeeze the material into the mould with a spoon and then empty it out of the form, all ready to go on the table. As a matter of fact, the filling of the mould requires great care and skill.

"The operator has to take the material bit by bit and force it with his fingers into every crevice of the interior of the pewter, which is usually in two or three pieces. In the case of the hen, the bird opens into two halves from bill to tail, at the back, and the workman, seated before a row of tubs containing different kinds of cream, first fills in the wings with chocolate; then he stuffs the places for the bill and crest with orange water ice, and loads the breast cavity with speckled bisque to give the proper effect. The tail is filled with pistache and the body suitably made up otherwise, the mould being finally closed and the halves fastened together again. But that is only the beginning. Next, the mould thus stuffed must be put in a freezer, with ice and salt around it for a while, and when it has got thoroughly hard, the cream hen is taken out of the mould and put in a cold air box to freeze some more. When it comes out of that it is like a rock, and the last thing is to touch up the feathers with water colors, outline the eyes, and give a smooth finish to the general effect. Then you have your hen natural as life, with a yellow beak and crest, brown wings, speckled body, and green tail. May be you seat her in a nest of spun sugar to heighten the effect. This is what you call art. The ice cream, too, tastes better when so prettily served. Of course, each kind of mould is filled on a different artistic plan. A swan, for instance, would be all of white vanilla with a yellow water ice bill."

"Where do the moulds that you use come from?" the confectioner was asked.

"From Paris," he replied. "They are very expensive. Twenty-five dollars apiece they cost, if not very elaborate. Pewter is the material always used, and I think they are made on wooden models. You can see for yourself how carefully they are made—each feather distinctly carved out so that it shows naturally in the cream bird. Beasts of different kinds and other things are equally artistic in other ways."

"You were speaking of spun sugar. How is it that you make it?"

"That is a confectioner's secret, and I oughtn't to give it away. However, I will tell you. No end of people exercise their wits to the point of despair in trying to make spun sugar. They know how to boil the sugar to just the right point, so that it will spin beautful threads, like silk; but when they have spun a few such threads, laboriously—not enough to fill a spool, perhaps — the mixture gets hardened and 'sugary,' and wont spin any more from the forks or whatever unsuitable instruments are employed. Now, I will inform you very simply how to make as good spun sugar as a confectioner can, in any quantity you may desire. Take two parts of granulated sugar to one part of cold water and stir them together in a saucepan—the larger the quantity, the easier the operation.

Let the mixture boil hard, without stirring, until a little of it dropped into cold water becomes at once as brittle as glass. Then remove the saucepan to a table and you are ready for business. Previously you must have provided yourself with a baker's egg beater, the wire end of which you have cut off with wire nippers, so as to leave a handle with perhaps fifty long wire points projecting from the end. This is the tool with which spun sugar is made. You dip it into the saucepan and draw it out, a thread of candied sugar hanging from each point, and thereupon you wave the tool in every direction, to the right and left, over your head and all around as far as you can reach, above the greased pans with which you have completely covered as large an area on table and floor as possible.

When I make spun sugar, I place in the middle of a large room a large quantity of the boiling sugar and cover the entire floor, save the small space necessary for standing room, with huge bakers' pans. Then my assistant and myself dip our wire brushes into the hot candy and throw the spun threads all over the place, up to the ceiling and this way and that, redipping the brushes as often as is necessary, until the room looks like a silk factory. Finally, when we have spun all we want, it is gathered up and made into any shape desired. By the way, it may interest you to know that if you will dip white grapes, mandarin oranges, figs, nuts and such things into the same mixture that is prepared for spun sugar, you can make in this way as good fruit glaces as can be bought at any confectioner's. When the sugar has been boiled to a "crack," pour it into previously warmed cups, drop in your fruits, fish them out as quickly as possible with forks, place them on greased pans, and set them out in the cold for a few moments. Twenty minutes later you will have the most delicious candies procurable. Would you like to know how to make ice cream for yourself as well as any confectioner can make it?"

"Very much indeed."

"Nothing could possibly be simpler.

"In the first place use pure cream, unmixed with milk or water—so long as the cream is not unusually thick—and fresh fruits. If you want to make strawberry ice cream, take a full quart of strawberries and a quart of cream. Mash the strawberries, put some sugar on them, and let them stand an hour or two. Then mix them with the cream and sweeten to the taste. Put the mixture into a freezer, turn the crank, and when it is frozen it will be as good ice cream as any one can produce. For orange water ice take the juice of a dozen oranges and three lemons and put with it as much water as there is juice, with sugar to suit the taste: then freeze it. The reason why home-made ice cream is nearly always a failure is that housewives will put milk or even arrow root into it."

"Is not a good deal of ice cream wasted by getting stale on your hands?"

"Not so much as a half pint. It will keep indefinitely in the porcelain-lined vessels we use. Tin is not good for the purpose, because it corrodes. How do we dispose of cakes that get stale on our hands? Throw them into the garbage barrel; nobody is poor enough hereabouts to want stale cake. The dough nuts and one or two other things sometimes are given to the garbage man personally. We don't lose so much in that way as you might suppose. Our loss is chiefly on charlotte russes, cream cakes, and eclaires, all of which sour in a day. The demand for these goods is very capricious, and we can never tell how many will be called for within a given 24 hours. May be 20 or 30 charlottes, for instance, will be left on the counter of an evening to be thrown away next morning. Mixed cakes, such as pound cakes, keep much better, though all cakes are best not later than the day after they are made. Macaroons will last fresh enough for a week. Pies are never left on our hands, because the demand for them is a very steady one. We might keep cakes for a long time in cold, air-tight boxes, but it is a trade necessity to have them always exposed on the counter or in a glass case that is constantly opened.—*Washington Star.*

* W. H. Wamsley, in *Journ. of Micros. and Nat. Sci.*

† F. L. James in *Mic. Bul.*

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WOOD CARVING.

To one having an idea of form and proportion, wood carving is not very difficult, even though a practical knowledge of drawing and modeling be wanting. Creditable specimens of carving have been produced by means of the pocket knife alone, by persons having dextrous hands and good eyes; but it takes a good workman to produce a fine job with poor tools, or none at all, therefore the average wood carver will be obliged to rely somewhat upon tools and appliances. In fact, the more complete the set of tools and the more perfect the accessories, the more readily can the work be done and the more satisfactory the result.

The principal tools are gouges, chisels, parting tools, curved and straight, a heavy mallet, a light mallet, a solid bench, and some clamps. As to materials: For the beginner soft woods are best, such as pine, whitewood, or cedar. After a little experience, pear, black

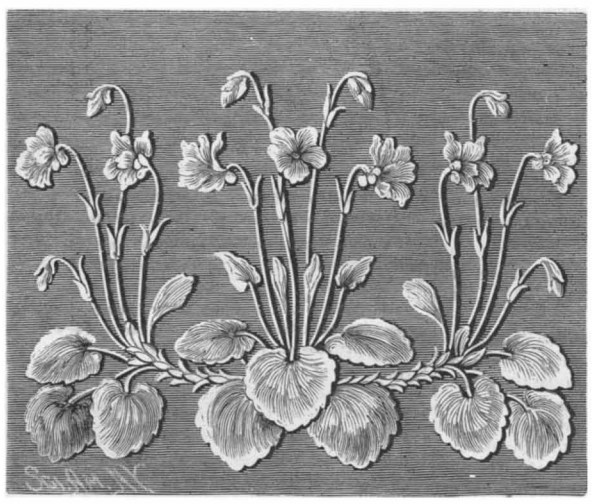


Fig. 3.—VIOLET PANEL.

walnut, and oak may be tried. Nine-tenths of the difficulty in carving is in working one's self up to the point of setting out in the work. The chances are that in the beginning the tyro will not succeed in producing the exact forms desired; but progress will be made with every successive trial.

It is, indeed, difficult to give any explicit directions for carving. We might almost say, here are the materials, the tools, and the design, the whole of carving is to take these tools and cut this design from this piece of material, using your own judgment, at the same time "making haste slowly."

The tools required are shown in Fig. 1, 1 being a firmer, 2 a straight gouge, 3 a curved gouge, 4 a bent chisel, 5 a front-bent gouge, 6 a back-bent gouge, 7 a parting tool, 8 a curved parting tool, and 9 a macaroni tool. These tools can be purchased either separately or in sets. There are other forms and many different sizes. It is well to begin with a half dozen medium sized tools, and then learn by experience what further tools are required. A flat and curved chisel and a flat and curved gouge, each one-half inch wide, a narrow deep gouge, and a parting tool are sufficient for the first effort.

The design is marked upon the wood to be carved, and the outline is shaped by means of a scroll saw, if

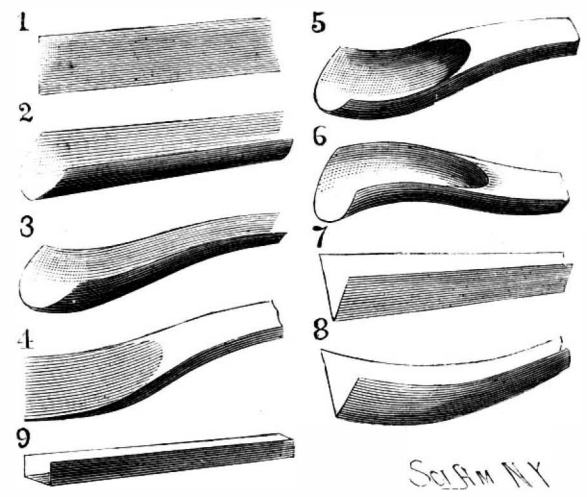


Fig. 1.—CARVING TOOLS.

Fig. 2.—EDGE VIEW OF TOOLS.

the design is to be in high relief, and the most prominent part is isolated from the rest by cutting down its sides with the straight gouges and chisels. Then the lower portions are roughed out, and so on until each part of the block is reduced to the requisite thickness. In this part of the work a mallet is required to drive the gouges and chisels into the wood and remove superfluous portions.

In the later operations of paring the work to give it the final shape no mallet will be required, the tools being pushed forward by the pressure of the hand. During this operation of paring, great care is required to avoid cutting too deeply, or raising slivers that run into the wood and spoil the work. Where the carving is done on a flat surface in low relief, gouges having little curvature are required.

The tools should be kept as sharp as possible, to secure smooth work and to economize labor. Carving tools are usually sharpened from both sides by means of suitable oilstone slips and by leather strops charged with crocus.

The wood while being carved is held in place on the bench by means of screw clamps, or by pointed screws passing upward through the bench into the back of the work.

In Fig. 3 is shown a panel of violets, which may be copied after some experience is gained. It is easier, however, to copy other carvings than to produce the work from engravings.*

Simple subjects should be chosen, and no work should be passed until it has been made as perfect as the tools, materials, and ability of the carver will permit. A final finish imparted with fine sandpaper is admissible; but neither sandpaper nor putty should be depended upon as material aids in this kind of work.

American Flax.

The tariff discussion has brought out some interesting facts with regard to flax production in the United States. More than a million acres in our Northwestern States are annually planted with the flax plant, but very little linen cloth, and that of the coarsest quality, is made here. A few mills are engaged in the manufacture of twine and thread from the fiber, but the flax is chiefly grown for the seed, of which some thirteen million bushels are produced each year. The crop is raised on new ground, the seed being thinly sown, and, without cultivation, bearing a heavy yield of seed. When this is ripe the plants are cut by horse reapers, the seed thrashed out by a machine, and the straw burned on the ground. The fact that flax is not grown here for its fiber is laid by some to the account of our climate as being too dry and hot for its best development, but by others to the great cost of cultivating the plant with such an end in view. In Europe each farmer devotes but a small plot to flax, prepares the soil as carefully as for a garden bed, sows the seed very thickly, and keeps the crop nicely weeded. The plants, coming up closely, grow tall and branchless, developing the fiber at the expense of the seed, and they are pulled up by the roots before the seed ripens. After this the fiber must be extracted on the farm by laborious hand processes, as it costs too much to send the flax in bulk to the market. It will be easily seen that, even were our climate propitious, American farmers would be slow to engage in such a time and labor absorbing industry.—*Garden and Forest.*

Ingenious Expedient in Hydraulic Engineering.

F. S. Pecke, a civil engineer at Watertown, N. Y., lately accomplished in a very simple, cheap, and expeditious way what is usually a difficult and expensive operation—the laying of a long line of pipe in deep water. He had occasion to lay nearly 1,000 feet of suction pipe at Rouse's Point. The water was needed for manufacturing purposes, and as it was found that water near the shore was more or less roily and impure, it was necessary to have the inlet a considerable distance out into the lake. He purchased for the purpose a steel pressure pipe of 8 inches diameter, manufactured by the Spiral Weld Tube Company, at East Orange, N. J., and used for couplings cast iron flanges, weighing, with bolts and gaskets, about 65 pounds to the pair. Plugging the end of the first length, he pushed it out on the surface of Lake Champlain and connected the second length, pushing this out in turn until the whole line was coupled. It then presented the unusual spectacle of a line of 8 inch pressure pipe, nearly 1,000 feet long, floating with a displacement of only 3½ inches of its diameter. When the requisite length had been connected, the line was towed to position, the plug at the end removed, and the pipe sank easily in 16½ feet of water without breaking a joint or receiving any injury. No buoys or floats were used in the operation, and no apparatus of any kind. The pipe is now in use as the suction of a steam pump, and gives perfect satisfaction. Work of this kind usually involves the use of expensive and troublesome flexible joints, and Mr. Pecke's ingenious expedient is worthy of record.—*American Gas Light Journal.*

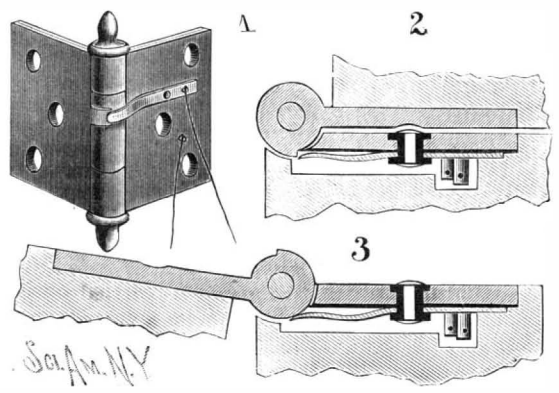
Production of Heat in Living Bodies.

Heats of combustion of the principal nitrogen compounds contained in living bodies, and their role in the production of animal heat, by MM. Berthelot and Andre.—The data and results are given for sixteen nitrogenous bodies. The average heat of combustion is 9,400 cal. for fatty bodies, 5,700 cal. for albuminoids, and 4,200 cal. for carbohydrates, taking one gramme of each substance. The conclusion is drawn that a weakening of the organism, with diminution of power of consumption of the food digested, shows itself first by general deposition of the most difficultly eliminated substances, fatty matters, then by failure to get rid of nitrogenous bodies, and finally by incapacity to consume the carbohydrates.—*Academy of Sciences, Paris.*

* The reader is referred to "Wood Carving," by Fred Miller, and "Manual of Wood Carving," by W. Bemrose.

HINGE CONNECTION FOR ELECTRIC BURGLAR ALARMS.

The invention herewith illustrated provides means whereby the local battery circuit used to ring an alarm will be instantly closed when a door to be guided by the alarm is moved on its hinges. It has been patented by Mr. William M. Bleakley, of Verplanck, N. Y. Fig. 1 is a side view of a door hinge having such a circuit making and breaking device, Figs. 2 and 3 being sectional views. On one leaf of the hinge is applied any suitable insulating material, such as cardboard protected by varnish from moisture, and upon the insulating material a leaf spring forming a good conductor is so secured as to project toward and be adapted to engage the hub of the leaf. To insulate the spring from the leaf, the fastening is made by means of a rivet enveloped with insulating material, as shown in Figs. 2 and 3. The hub has a slight projection, formed by an annular flattened rib cut away for a short distance near the leaf, producing a recess which prevents contact with the spring when the hinge is folded, as shown in Fig. 2. Between the insulated rivet and the inner end of the spring is a binding post connecting the battery wire with the spring, another binding post on the hinge leaf connecting the other terminal of a battery circuit thereto. With this arrangement, when the door is closed, and the hinge is in the position shown in Fig. 2, the circuit remains open; but on the door being party or fully opened, the circuit is instantly closed and the electrical connection sounds an alarm. The device can also be readily arranged to sound the alarm when the circuit is opened, instead of when it is closed, by



BLEAKLEY'S HINGE FOR ELECTRIC BURGLAR ALARMS.

reversing the position of the enlargement on the hub, so that when the door is closed the spring will bear on the hub and produce a normally closed circuit that will be broken when the door is opened.

Indian Copper.

Dr. Charles C. Abbott, the Curator of the Archæological Museum of the University of Pennsylvania, recently read a paper on "Implements from the Workshop of a Prehistoric Coppersmith." Dr. Abbott in his prefatory remarks referred to the two views now prominent with reference to the peopling of America. The one that the Indian is indigenous and native to this country, the other that from successive migrations from other continents a people arose that finally became the now readily recognized American Indian. "There is much to be said," he continued, "in favor of the former view, and yet I cannot myself summarily dismiss the arguments in favor of trans-oceanic migration." He then proceeded to discuss the use of copper among the Indians.

It is mentioned in the earliest references to Indians by European visitors to America. Captain John Smith, in his history of Virginia, speaks of the Indian women of the Southern Atlantic coast having pendants of copper, and again that "the Mangoaks have plenty of it, and beautify their houses with great plates thereof." Captain Smith found the Virginia Indian covetous of copper, and refers to a common personal ornament, consisting of "a broad piece of copper," and also to the custom of throwing pieces of copper in the river, when passing by their burial places. The records of the visitors and settlers in New England in the 17th century contain frequent references to copper, and Champlain records of an Indian whom he met in the valley of the St. Lawrence, that "he drew from his bag a piece of copper the length of a foot, which he gave me; the same was very handsome and very pure; giving me to understand that he had a quantity of it where he had taken this, which was on the border of a river near a great lake." These many references to copper give no hint of its use for any other than ornamental purposes, and yet, besides a few scattered beads, the few objects that have been procured from graves and village sites along our Northern Atlantic coast are either spear heads, arrow points, or celts.

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RECENTLY PATENTED INVENTIONS.

Railway Appliances.

CAR COUPLING. — James Mutton, Frisco, Utah Ter. This invention is designed to provide a coupling with which any form of drawhead may be conveniently and expeditiously attached to the draw-bar, as well as a drawhead which will remain locked with an opposing drawhead, the device being one which can be uncoupled from the top or side of the car.

CAR COUPLING.—James F. Shannon, Macomb, Ill. Combined with an apertured drawhead, a guide block, and a plate spring extending therefrom attached to the drawhead, is a slide block and a plate thereon to support a coupling pin in uncoupled position, the device being an improvement in link and pin couplers, whereby the coupling may be effected automatically.

CONNECTING ROD FOR BRAKE BEAMS.—Christian Feil, New Utrecht, N. Y. The main rod has attached thereto a bent supplemental rod, notched clamp plates being applied to the rods, one at each edge of the brake beam, making a secure connection with the beam without enlarging, boring or recessing it, the invention being applicable for street and other cars.

BAGGAGE CHECK.—Frank H. Crump, Washington, D. C. This is an excess tag with protective flap and bearing underneath similar coupons with printed scale of excess in weight and the date, to be punched by the agent, the coupons being successively torn off by each road over which the trunk passes, and thus constituting a basis of settlement with the road first receiving the trunk.

Mechanical.

WORK HOLDING TABLE FOR CARVING MACHINES.—Frank R. Potter, New York City. This is a table for supporting work of different lengths and widths, or work curved upward or downward or to either side, without the use of blocks or plates, the invention covering various novel features of construction and combinations of parts.

DRESSING TOOTHED CHISELS.—Floyd G. Smith, Buckhannon, West Va. This invention provides a machine for dressing chisels used by marble and stone cutters, there being used, in connection with a punch, a die made in sections and adjustable, so that it can be set to suit any suitable size of punch, for the dressing of the most delicate carving tool or the largest size of chisels.

FRICTION CLUTCH. — William H. McConnell, Nelsonville, Ohio. This is a device designed to be simple and durable in construction and especially adapted to all classes of hoisting and other machines, comprising two segmental arms pivoted at one end of the driving pulley, toggle arms connected with their free ends, and a block or crosshead sliding radially on the driving pulley and connected with the toggle arms.

Agricultural.

CORN PLANTER.—Knut Buland, Linn Grove, Iowa. This is a machine in which the seed dropper also acts as a marker, the ground being broken in advance of the planters by pulverizing disks, while grooves in the drive wheels, following in the track of the planters, cover the earth over the seed dropped.

SEED PLANTER AND FERTILIZER DISTRIBUTER.—John M. Johnson, Prosperity, S. C. This is a machine of the sulky class designed to simultaneously plant two rows of cotton or other seed or distribute two lines of fertilizer at variable distances apart, and whether the rows or lines be straight or laterally crooked, while most of the mechanism is within easy reach of the driver from his seat.

SICKLE DRIVING MECHANISM. — Patrick C. Gibbons and George R. Heaberlin, Baring, Mo. This is for use in connection with mowers and similar machines, a pin being adapted to travel in the groove in the sickle-driving wheel to sustain friction equally upon all its faces and be capable of instantaneous reverse movement, imparting a uniform movement to the sickle bars and preventing their becoming clogged.

LAWN MOWER. — Jules P. Blondeau, St. Joseph, Mo. This invention covers a combined grass receiver and dumper to catch and carry the grass while the lawn mower is being operated, avoiding the labor of raking and injury to the sod, the attachment being readily applied to or removed from a lawn mower and adjusted to handles of different height.

Miscellaneous.

REEL HOLDER.—Henry A. Buchholz, New York City. This is a device whereby a number of reels containing ruching or other material for exhibition may be so placed in a stand or holder as to be conveniently examined, the device being of simple construction and readily manipulated.

WAFFLE IRON HANDLE.—Ernest H. Chesterton, Los Angeles, Cal. This is a handle adapted for quick application to the handle socket of the iron, and consists of a double-armed spring strip, the ends of the arms being arranged to fit within the iron sockets, and one or both of the arms having projections adapted to bear against shoulders formed on the iron sockets.

FOLDING TABLE AND STEP LADDER.—Levi Tobey, Morris, N. Y. This is a combination article of furniture, designed to be readily placed in position and firmly held for service in either capacity, being especially fitted for an ironing table, while it is strong and durable, and can be folded so as to occupy but little space.

HAME.—Martin V. Nichols, Port Arthur, Ontario, Canada. This hame has a slot or passage for the hame strap, with a number of blocks adapted to fill such passage, except the room necessary for the strap, the blocks being adjustable, whereby the strap may be held above or below or between them, the place of connection of the hames with the strap being set at any point desired.

STEERING APPARATUS FOR VESSELS.—Julio E. Garcia-Sanchez, New York City. This invention provides for a rudder at the bow as well as one at the stern of the boat, the two rudders being connected and operated by tiller ropes from a drum mounted in standards on the deck, the tiller ropes being reversely wound on the drum, so as to turn the rudders in opposite directions.

WINDMILL.—Julio E. Garcia-Sanchez, New York City. This is a windmill of which the wings may be lowered and closed when not required for use and automatically opened by the wind when raised into position, and in which also the rate of movement of the mill may be readily regulated, the invention covering various novel features and combinations of parts.

SURFACE WATER DRAINAGE CONNECTION.—Charles P. K. Kahler, Baltimore, Md. This invention provides means, in connection with a pipe or conduit and suitable basins, whereby the waste water may be carried off without having gutterways at street crossings, and whereby the water may be carried from one side of the street under cable conduits and the like to the other side.

SANITARY SERVICE TANK FOR WATER CLOSETS.—Richard A. L. Blondel, No. 60 Hudson Street, Boston, Mass. Two patents under this title have been issued to this inventor, one providing a flushing valve in a water closet tank, an after-filling valve, and mechanism by which to operate both valves, with no danger of the tank overflowing or of a constant flushing flow, while the siphon of the closet is kept properly filled at all times; and the other providing, in connection with the tank and closet proper, a circuit having two breaks, a closer for one of such breaks being arranged for operation whether the tank be full or empty, while a second closer is automatically operated as the tank fills and empties, so that it will close the circuit when the tank is full and break the circuit when the tank is empty.

PIPE STOPPER. — William Baguley, New York City. This device consists of a split collar with apertured lugs engaging bolts having eye bolts received by a head plate with apertured lugs, such stoppers being more particularly designed for use in testing waste pipes to detect flaws through which sewer and other gases would escape.

ORE FEEDER. — George C. Mueller, St. Louis, Mo. This is a conveyer especially adapted for feeding crushed ore to stamp batteries, whether the material is fine or coarse, wet or dry, and has a casing with inclined bottom in which a screw conveyer is held to revolve, while a vertically adjustable essentially triangular shed is located in the casing above the conveyer.

BURNING HYDROCARBON OILS.—Ethan Rogers, Ballston, N. Y. This invention is designed to overcome the difficulty in burning oil by means of a blast, providing a system by which the pump employed to raise the oil to flow to the burners is driven by the belt employed to drive the fan, whereby the fan must operate when the pump is operated, and the required amount of air will be delivered at all times to the burner.

HEATER. — Charles L. Haight, Pittsburg, Pa. In this device a duplex hood is employed, adapted for suspension above the burner, the inner hood having an opening in its upper portion, and there being a connection between the outer hood and the heater, the construction being especially adapted for use with natural gas burners, to concentrate the ignited gas at the burner and conduct the heat with the waste products downward through a heater, and thence through and out of the heater to the flue in which the burner is located.

EXTENSIBLE STOVE PIPE JOINT.—James P. Warren, Chicago, Ill. A longitudinal rod is secured at one end to the inner side of one joint of pipe and a vertically slotted bracket on the inner side of the other section, the rod passing through the slot, in which a vertically swinging cam is pivoted, whereby a joint may be quickly and conveniently altered in its length to suit the situation and avoid the making of a special joint.

FOUNTAIN.—Charles P. F. Baillairge, Quebec, Canada. This fountain is made with a double casing having a water space between its walls, jet orifices in the outer wall and opposite lenses in the inner wall, in combination with which an electric light or other lamp is used, with or without colored lantern panes, to direct a beam of light through the lenses and into the issuing jet of water.

TRACE DETACHER. — John D. Blakeman, Smith's Grove, Ky. This is a detacher for singletrees such as formerly patented by the same inventor, and consists of a novel construction and arrangement of parts whereby a pull upon a strap is made to quickly disconnect the trace from the singletree.

COMBINATION GARMENT. — John T. Brodnax, New Orleans, La. This is a combination shirt or vest and suspenders, the invention being an improvement on a formerly patented invention of the same inventor, providing a new construction, combination and arrangement of parts.

UNDER GARMENT. — This is another patent granted the above inventor, according to which a re-enforce is applied to the fronts and backs of all kinds of vests and shirts, especially dress or bosom shirts, to greatly increase their strength and durability and provide pockets or passages in which suspenders are covered and concealed, while having all required freedom of lateral movement.

BANGLE. — Joseph P. Howard, New York City. This is a multiple bangle, comprising in one several rings or bands to encircle the wrist, and is so made in the means of uniting the several rings to each other that the bangle may be enlarged to facilitate putting it on and off, and when on the wrist it will automatically close snugly thereto.

NEW BOOKS AND PUBLICATIONS.

GEMS AND PRECIOUS STONES OF NORTH AMERICA. **A popular description of their occurrence, value, history, archæology, and of the collections in which they exist, also a chapter on pearls, and on remarkable foreign gems owned in the United States. By George Frederick Kunz. The Scientific Publishing Company. New York, 1890. Pp. 336. Illustrated with eight colored plates and numerous engravings. Price $10.**

The above summary of what is contained in this work, coupled with the name of its distinguished author, is sufficient assurance of its value. In general terms, it covers the entire ground of the mineralogy of gems with special reference to this continent. Up to the present time, North America has done little in the way of contributing to the world's riches in the way of jewels, and one of the objects of Mr. Kunz's work is to act as suggestion to the miners and mineralogists of America, in order that they may bring forward their country into the front ranks of jewel-producing lands. Much of Mr. Kunz's past work has been familiar to our readers, and this book fully sustains his reputation. It is printed and illustrated in very elegant form, appearing a true *edition de luxe*, one worthy a place beside King's classic treatises on gems. The colored plates are a surprise to the mineralogist from their accuracy of coloring and drawing. A very interesting chapter is devoted to the work of the aborigines of America, and shows that these primitive races did more proportionately in their own way to utilize the beautiful minerals of America than have their Caucasian successors.

L'EXPOSITION UNIVERSELLE. **Paris: J. Rothschild. 1890. Pp. xvi, 694. 700 illustrations.**

The entire history of the Paris exposition of 1889, its preliminaries and general features, and the details of all its parts, are given in this volume in the systematic method and well arranged form so characteristic of French publications. For those familiar with the French language it gives in small compass all that can be desired concerning the exposition in general. The numerous illustrations, many of which will be familiar to our readers, add to the value and interest of the volume. Many interesting figures of cost, etc., appear. Thus it is shown that the actual cost of the main buildings and appendages was less than thirty millions of francs, and amounted to three millions less than the estimates. The construction of the great buildings and of the Eiffel tower are well illustrated and described. Several portraits of those connected with the administration of the fair are also of interest.

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1. Elegant plate in colors representing a tasteful cottage of moderate cost at Buffalo, N. Y. Perspective elevation, floor plans, sheet of details, etc.
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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(2252) J. B. asks for the simplest way to ascertain the amount of lime in Paris white or whiting. A. Dissolve in dilute hydrochloric acid and precipitate the lime from ammoniacal solution (filtering first if necessary) with solution of ammonium oxalate.

(2253) J. M. T. asks: 1. What is meant by an alternating current, and what is its primary object? A. An alternating electrical current is one which flows alternately in opposite directions. It may be used like other currents for electric illumination, and finds one of its chief applications in the transformer system. 2. How many Leclanche cells will it require to light a 16 candle power incandescent lamp? A. The Leclanche battery is not at all suited to electric lighting purposes. It would require a large number, say 100, to run a 16 candle power lamp for a short time.

(2254) H. H. asks: What is most beneficial in preventing the sweating of feet? A. Try the following: To one part of salicylic acid add one of subnitrate of bismuth and two of starch. Wash, and apply powder freely.

(2255) J. W. M. asks how to make a silver polish for lead pipe that will last about six months. A. To a 10 per cent solution of nitrate of silver add ammonia until the precipitate first formed is redissolved. Add about one-tenth the volume of whiting, and apply after shaking, with a rag. It will stain the rag, fingers, and any organic substance it comes in contact with.

(2256) C. B. H. asks how to remove the coloring matter from a strong solution of sal soda and soap bark. A. Try filtering through a percolator or funnel packed with bone or blood charcoal.

(2257) C. B. W. asks for a recipe for a grafting wax. A. Melt together 3 parts resin, 3 parts beeswax, and 2 parts tallow.

(2258) A. T. writes: I would like to nickel-plate some small articles. Can I do it without a battery? If so, please tell me how. A. To nickel-plate satisfactorily, some kind of battery is advisable. We refer you to our SUPPLEMENT, No. 436, for formula, etc. On some materials a slight nickel coating can be obtained by simple immersion in the nickeling solution.

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TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

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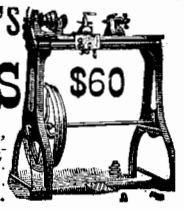

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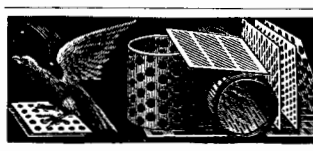

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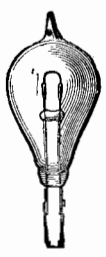

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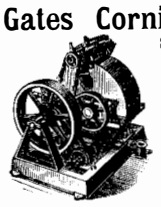

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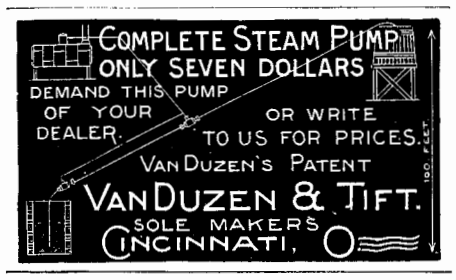

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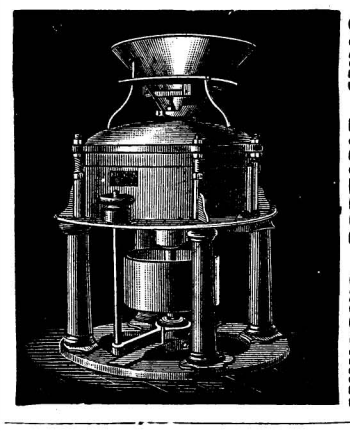

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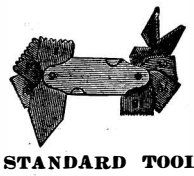

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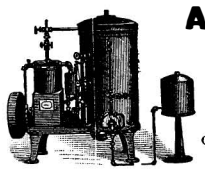

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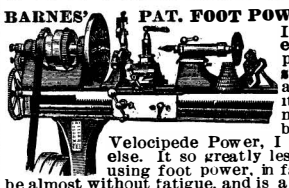

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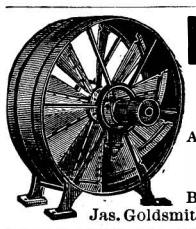

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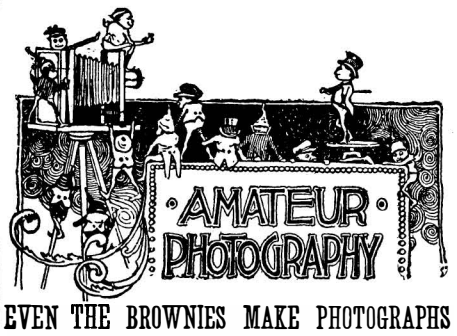

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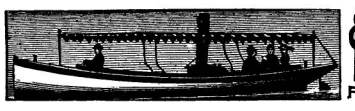

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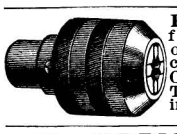

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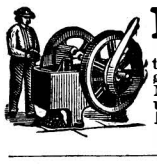

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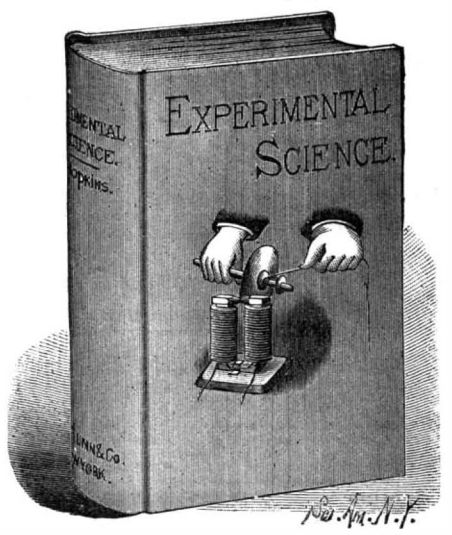

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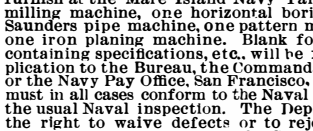

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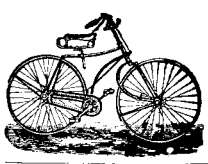

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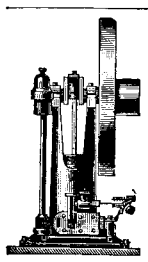

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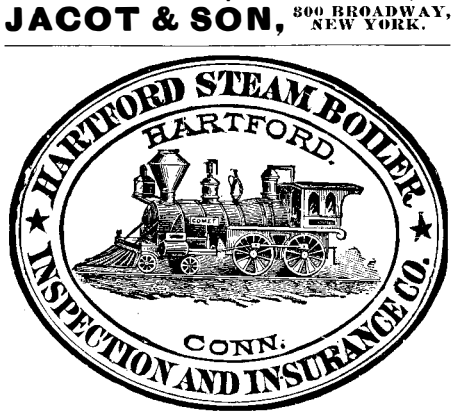

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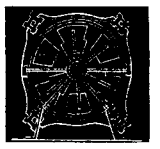

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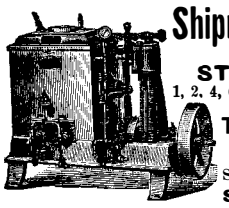

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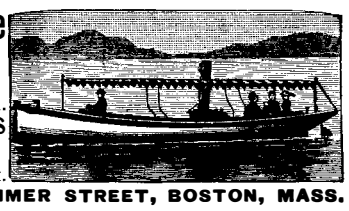

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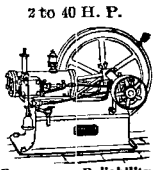

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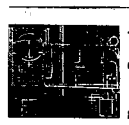

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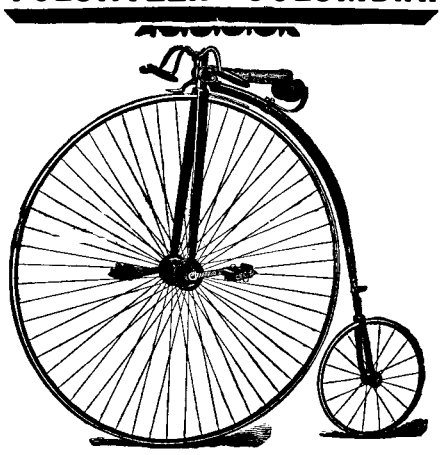

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